LEARN FLAT SLAB

A Software for Analysis, Design, Estimation, Costing & Drawings of Flat Slabs

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LEARN FLAT SLAB

A Software for Analysis, Design, Estimation, Costing and Drawing of RC Flat Slab, Columns & Footings of Building

LEARN FLAT SLAB STEP BY STEP

INTRO & LIMITATIONS

- **Please take Print Out of Every Step, including this page before commencing Learn. Take a Yellow Marker Pen and Mark the Learning Process while Proceeding further. This is Essential for Learning.**

- **The software performs Analysis, Design, Estimation & Costing of A RCC Flat Slab at a given Uniform Level (2D). Multiple Level Floors (3D) cannot be analyzed. Building Plan shall be square / rectangular in shape, hidden beam inclined in Plan cannot be designed by this software. Flat Slab also designs building Columns (under Bi-Axial Moment) and Isolated Footings (Under Uni-Axial Load) when Column Project file is created by the user. Column & Footing quantities & costs are added to floor costs to arrive at complete building cost.**

  The Software basically requires a User to enter floor data for Joints, Columns, Beams, Slabs, Point loads & Continuity. The rest of the things are taken care of by the software.

  The results are displayed in the form of BM & SF, Beam & Slab Schedule, Quantities, Cost, Bar bending Schedule for Beams & Column Loads.

  Graphics option are available for display and tabular Format is available for Editing and Deleting Data.

  A User should Delete / Edit Input-Data through the various Program Options only. If any editing is done outside the design environment than Data files may become corrupted. All Data should be Strictly "Entered" as explained in following steps.

  Extensive Printing options are available under each display. Printing is straight forward with default set of values (Arial Font, 8 mm Thick, Bold, Portrait). Only Beam Schedule will be Printed in Landscape Orientation.

  The best way to go about the software is to Mark on the Floor Plan, Joint, Beam, Column and Slab Numbers. A Joint represents a Column location or an intersection between 2 Beams. The Beams are represented by its location in the form of Right Hand Side (RHS) & Left Hand Side (LHS) Joint numbers. The Slabs are represented by LEFT BOTTOM & RIGHT TOP joint numbers. All Joints will have X & Y Co-Ordinates, Top Left corner is taken as origin (0, 0). Joint / Beam / Column / Slab numbers should start with " 1 " and should not be repeated.

  The Program will generate automatic Joint, Beam, Column & Slab Numbers from the information given in Project File. Some of these Numbers / Members may not be required & shall be deleted in a systematic manner as explained in the following chapters. The Final Plan Graphics should look exactly as the Floor Plan.

- **Hidden Beam marking in flat slab is different than the normal floor plan GA.**

1: Mark the Hidden Beams (Column Strips) in the same way as you Mark the Normal Beams but remember the following differences.

2: Hidden Beam (Column Strips) depth shall = Flat Slab (Middle Strips) Thickness.

3: All Flat Slab (Middle Strips) thickness shall be uniform.

4: Initial (Trial) Flat Slab Thickness =
Max. Span of Beam or Slab in the Floor in MM ÷ 28.

5: Keep Column Size as Large as Possible, Larger the Column size lesser the Flat Slab thickness.

6: Minimum Column size allowed is 300 x 300 MM.

7: Try to Avoid secondary beams, i.e. hidden beams resting on one another.

8: Avoid concentrated loads, else flat slab thickness will be very high.

9: Convert wall line load in to UDL as w ÷ (0.6 * slab_span). and avoid beam below wall line load. Refer IS 456-2000, clause 24.3.2.

10: Hence convert all internal partitions in to equivalent UDL & avoid beams.

11: Try to Keep Minimum spacing of beams at 2.0 M C/C.

12: In order to get most optimum design keep the slab and beam spans uniformly within 20 % of each other.

13: Spacing of columns shall be as uniform as possible within say 20 % of each other.

14: Avoid Eccentricity of Walls vis a vis Hidden Beams and Columns.

15: One Way Shears are calculated at effective depth from Column face and Punching shear at deff ÷ 2.

16: BMs are calculated at Column face.
BM & SF are calculated at Beam Center Line for Beam to Beam Joint.

17: Flat Slab depth to be revised, if steel area exceeds 182 cm2.

18: In Case of Un-safe Hidden Beam design Reframe the Plan or Revise Slab Depth or Column Size or Concrete Grade.

19: Flat Slab Design is meant for Vertical Loads only, for Lateral Loads Shear walls or Bracing Systems shall be Provided.

20: For Analysis & Design of Shear Wall refer our Super Civil CD software.

21: For Design of Bracing Systems refer our Steel_2007 software.

22: Designer to Calculate DL + LL Moments in Columns from both the Axis. The Width and Depth of Hidden Beam will be displayed after running Analysis option. Frame Analysis under DL + LL shall be performed along both the axis and Column Moments shall be entered using Column Display Option. If DL + LL Column Moments are not Entered then Design of Flat Slab will be in-correct.

- ***The End Column (Exterior Support) DL + LL Moments are very Important in Flat slab design. One of the Governing Criteria for Flat Slab thickness is End Support Moments.***

- ***Moments at an Interior Support is maximum of those obtained from (a) Frame Analysis and as obtained from (b) Clause 31.4.5.2 of IS - 456 - 2000 (after distributing Moments in Upper & Lower Column as per their stiffness).***

23: Use any 2/3 D Frame Analysis Software or for Quick Results Use Our Own 2 D Frame Analysis Software to Perform Frame Analysis in Each Direction.

24: Beam Loads can be taken as tributary or UDL for Frame Analysis.

25: Main Steel is to be placed in Longer Direction & not in Shorter Direction.

26: Convert Non Rectangular Column into Equivalent Square Column before Designing.

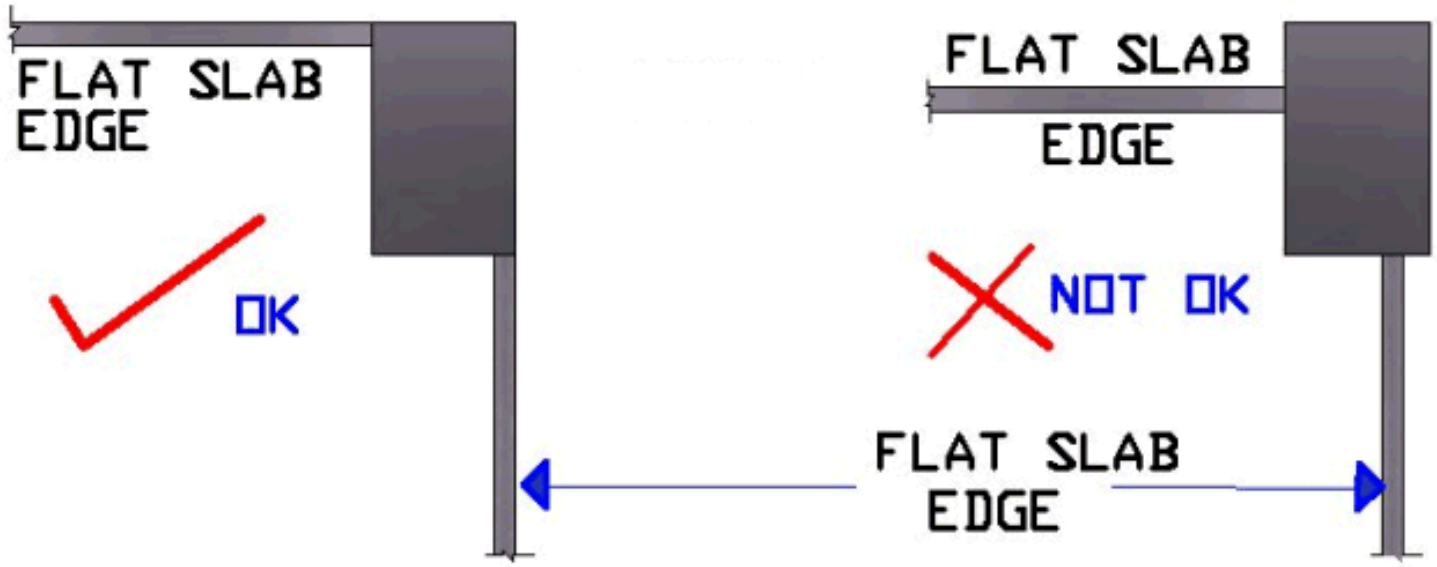
27: Min Reinforcement % in Either Direction = 0.20 %.

28: Reinforcement Spacing Shall not Exceed 2 x Depth.

29: Sometimes Design gives Congested steel or Links, Use Substitute Program given with software to change Re-bars numbers, Spacing and Link diameter.

30: Use High Grade of Concrete Preferably M 30 or M 35.

31: At Ends and Corners the Flat Slab shall Extend up to or beyond Outer Edge of Column Else Flat Slab will Fail in Punching. Refer Details as under.



32: Large openings cannot be provided in Flat Slab.

33: Small openings say <= 300 MM can be located near the center of Slab.

34: Staircase panel shall be treated as normal slab & not as opening, Program will calculate the Loads automatically.

35: All Walls are assumed as Brick wall of 1.8 T/M3 density, if wall is of different density then width shall be changed proportionately.

36. In case of Unsafe Flat Slab / Hidden beam Design, any one or all of the following measure shall be adopted.

- **Reframe General Arrangement (GA) / {Beam layout} Plan.**
- **Revise Hidden Beam / Flat Slab Depth.**
- **Increase Column Size.**
- **Increase Concrete Grade.**

37. When the DL + LL Column Moments are high compare to DL + LL vertical Loads, the program will indicate higher column size at upper floors & not at lower floors. A designer has to overcome this problem by adjusting the column size or % of reinforcements along the column floors.

- **Cantilever beams cannot be analyzed.**
- **Beams / Columns / Slabs shall be along two mutually perpendicular axis (X and Y). Polygonal (Multi-sided) slabs cannot be analyzed.**

- **Export to Excel :**

  When the " Analysis Result -> Bending Moment & Reaction " option is Run, a Text file is automatically created. This File will open in Any Text Editor. You can also Open this Text File in EXCEL.
  Start Excel -> File -> Open -> Delimited ->Next : Delimiters -> Comma ->Next -> Finish.
  Now you will notice that Complete Data is displayed in Excel Spread Sheet.
  In Excel Sheet Editing, Deleting, Sorting, Printing & Merging of Data/Files/Excel Sheets is Extremely Easy.

  Similar Text files are created in " Shear Corrected BM & SF " (Design BM & SF), " Beam Schedule ", " Slab Schedule " & " Column Loads " option for Exporting Results to Excel Spread Sheet & its subsequent Manipulation.

  Export to PDF:

  A free PDF Creator Program is available with this Software. Designer can directly export to PDF instead of printing various reports.

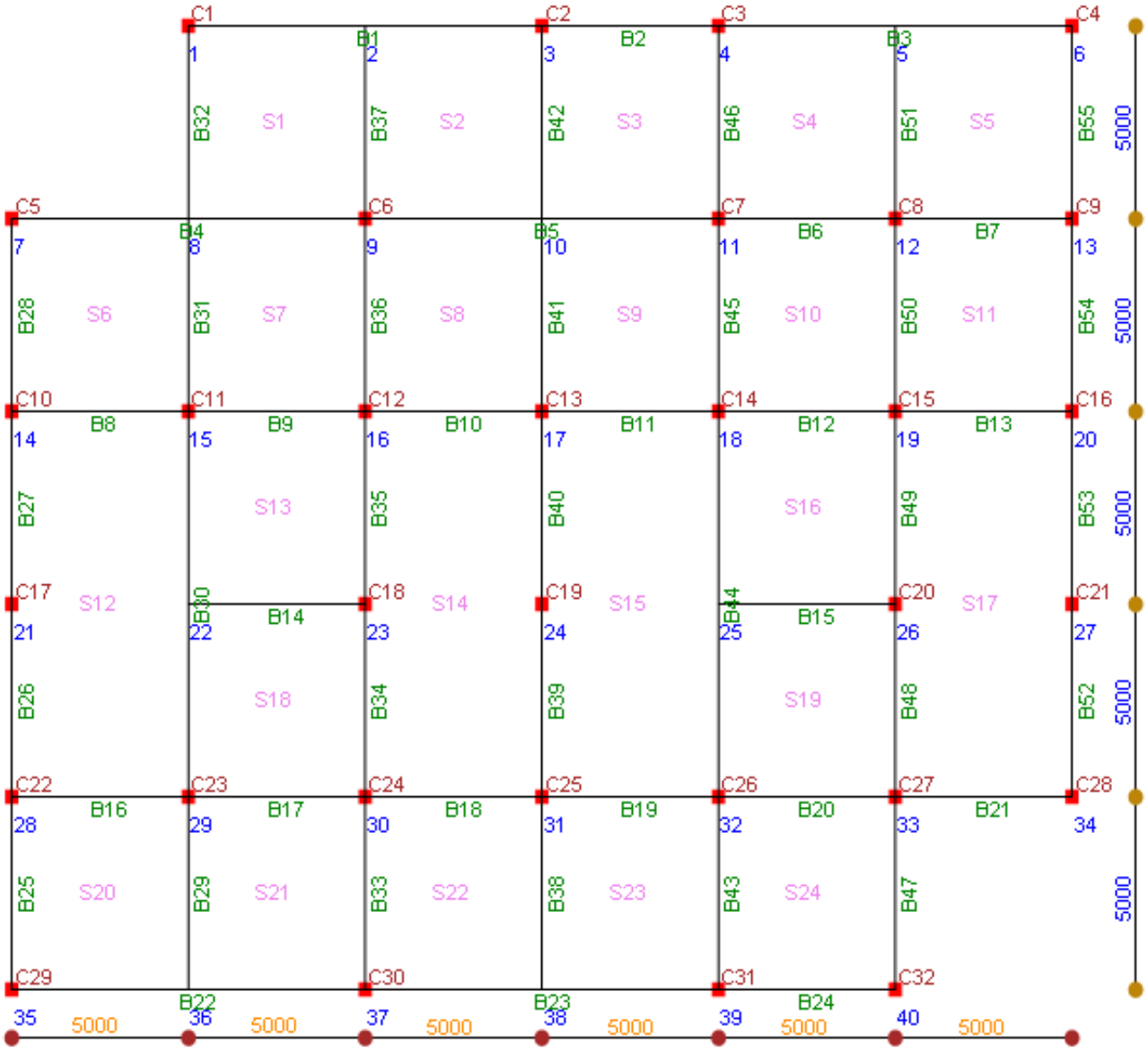
- **Intersecting Joints between two Beams (Main & Secondary) is assumed as Hinged. Hence no Moment transfer is envisaged.**
- **After data input, the user has to switch over to graphic option for visual checking of joints / columns / beams / slab nos. When the data is error free the user can run the Analysis, Design and Quantity options. The various results are also available through display or print options.**
- **Analysis, Design and Quantity options should be run in strict order, else program will give unexpected results.**
- **Program creates automatic Joint numbers as per nos. of Horizontal & Vertical Grids. Here Grids means Beams coming along Column center lines as well as all Internal Beams not aligned with columns. A user has to input Information regarding Horizontal & Vertical Grids while creating Project File.**
- **A user can delete the Joints not required by using Joint Option.**
- **Joints will be automatically re-numbered when "UPDATE" button is clicked or at "EXIT".**
- **Remember to Delete / Edit Corresponding Beam / Column / Slab Member, whose Joint has been deleted.**
- **Always delete Beam / Column / Slab member from the "END" to facilitate further Editing. After Deleting press "UPDATE" button for re-numbering of members.**
- **After Deleting corresponding Beam / Column / Slab Member & Updating, edit the required Joint Numbers of affected Beam / Column / Slab Members.**
- **Go through the "READ ME" Button for better understanding of that particular Option.**
- **For Durability aspect of Design, refer our " Super Civil CD " software.**
- **Beam Bar bending codes and details are as per enclosed standard drawings.**
- **Hidden Beam / Flat Slab Depth < 200 and > 600 MM not permitted.**

- **Hidden Beam Width is calculated automatically by the Program.**
- **Links (Stirrups) < 75 MM for Hidden Beams is not permitted.**
- **Hidden Beam Reinforcement > 4 % not permitted.**
- **Age factor is considered as 1.15.**
- **All Columns are placed Centrally with respect to Beams in either direction. There is no provision to offset the column in either direction. If the offset is large than user should re-workout the Beam Span. Column design is fully automatic, Input from the User is not required. Column Size is governed by Initial size given by the user and allowable standard size and reinforcement %, Refer Step No. 5 and 16.**
- **All Foundations are designed as Isolated Footings under Pure Compression. No moments are allowed in any direction. User should Analyze all Building frames considering Base as Hinged. Isolated Footing design is fully automatic, Input from the User is not required. Footing Size is governed by allowable bearing capacity (SBC) of soil and the initial size given by the user. Footing is optimized by having offset in either direction from column as equal, hence footing reinforcement in both direction is same. Overlapping footings should be corrected by changing the footing dimension, keeping the required base area constant OR by making Combine footing / Raft / Piles etc.**
- **Minimum Computer RAM memory of 1 GB is recommended.**
- **Use Laser OR Ink Jet Printer.**
- ## References:

1. BS - 8110 - 1997.
2. IS - 456- 2000 / 1978 / 1964.
3. SP 24 - 1983.
4. Advance Reinforced Concrete Design by P. C. Varghese.
5. Reinforced Concrete Designers Handbook by C. E. Reynolds.

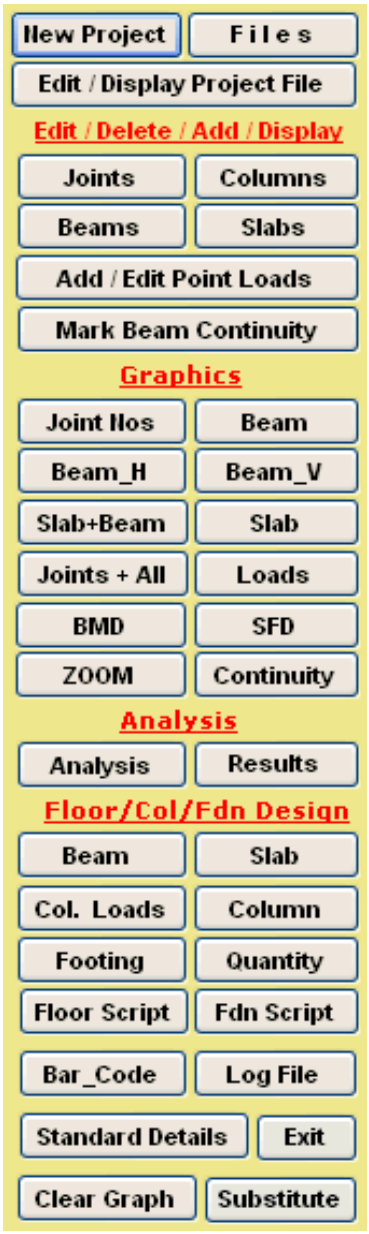
LEARN FLAT SLAB STEP BY STEP

STEP NO. 1 : New Project (File) Creation

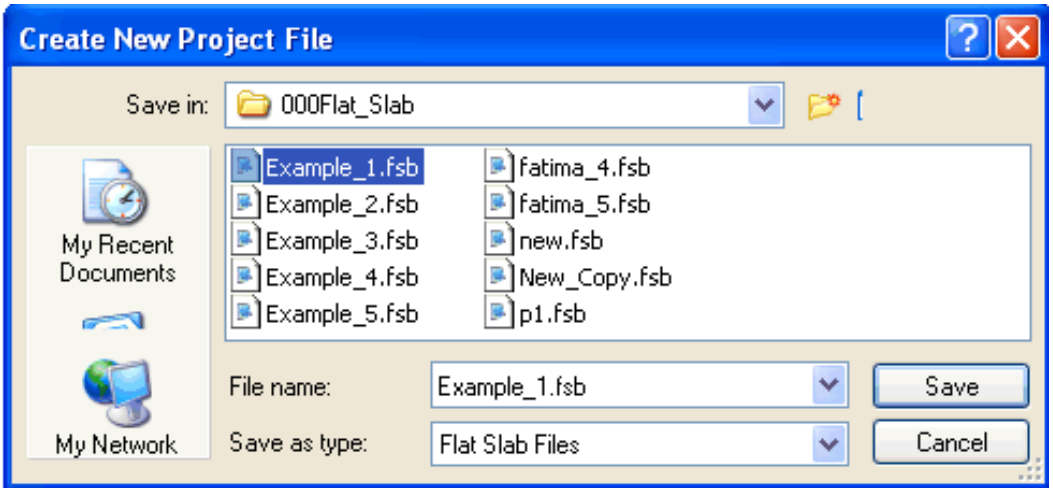


ACTUAL REQUIRED FLOOR PLAN

- **Refer the above Floor Drawing. Our Intention is to Analyze, Design, Estimate, Cost & Prepare BBS for the same. The above floor has 40 # of Joints, 32 # of Columns, 55 # of Beams and 24 # of Slabs.**
  Please go through the following steps carefully, so that we can achieve our object efficiently.



- **When Program starts, the graphics above is displayed. Consider the " New Project Option ". Click the " New Project " option in the MENU bar. The following window will open.**



- **You must create a separate Folder / Directory to store your files.**
  I have created a Directory called " 000Flat_Slab " in C drive to store my Project files.
  Now go to this folder & give a file name to your project. I have given " Example_1 " as the name of my new project file. Click the save button. Following project window will open.

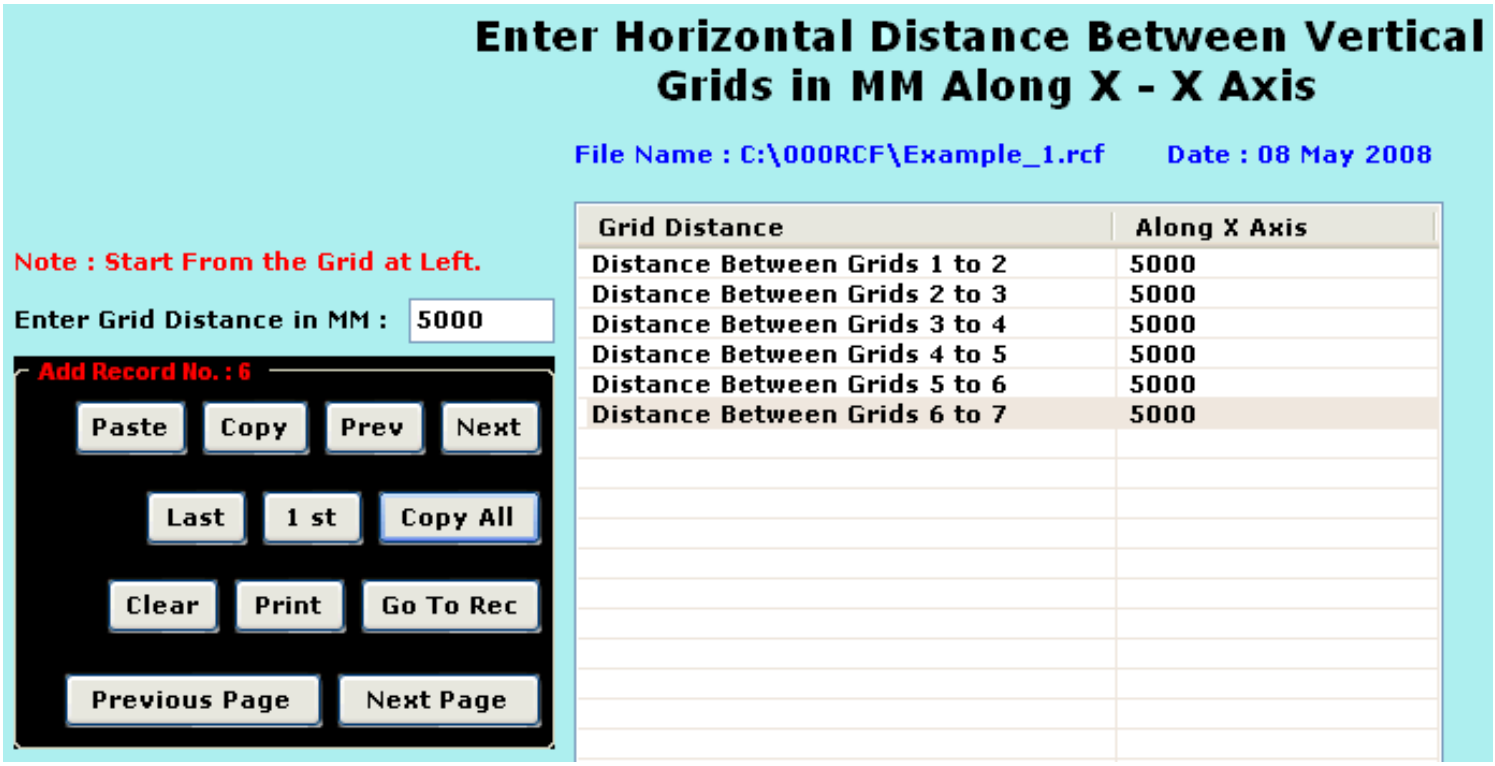
Add Project Details :

Organization	Super Civil CD	Net Height of Brick Wall in M	2.55
Project	20 Story Bldg.	Thickness of Brick Wall in MM	230
Project No.	8912	Default Flat Slab Thickness in MM	200
Building ID	Admin	Default LL on Slab in T / M2	0.50
Floor No.	12	Thickness of Floor Finish in MM	40
Floor Level	36.0	Thickness of Ceilling Finish in MM	20
Floor Width (X Axis- Horiz. Dist.) in MM	30000	Default Partition Load in T / M2	0.10
Floor Length (Y Axis- Vert. Dist.) in MM	25000	Column Dimension Along X-X Axis in MM	600
No. of Vertical Grids (For Horiz. Dist.) Each for Every Beam and Column	7	Column Dimension Along Y-Y Axis in MM	300
No. of Horizontal Grids (For Vert. Dist.) Each for Every Beam and Column	6	Default Storey Height in M	3
Concrete Grade	M25	Concrete Rate in Rs / M3 Including Shuttering	9000
Clear Cover to Main Steel in MM	25	Reinforcement Rate in Rs / Ton	60000
Default Hidden Beam Width in MM	1000	Masonry Work in Rs / M2	1500
Hidden Beam (Flat Slab) Depth in MM	200	Plastering in Rs / M2	350
SBC in T/ M2	20	Painting in Rs / M2	150
Footing Depth below G.L. in M	1.5	Total Door + Window Area in M2	112.5
		Door / Window Rate in Rs / M2	3000
		Excavation + Refilling Rate in Rs/M3	450

EXIT | PRINT | READ ME | NEXT PAGE

- **The window requires various project details. Whatever values you will fill here will serve as default values for the project.**
  I have filled up the above values as required by my new project " Example_1 ".
  The Initial trial value of hidden beam width = 1000 MM, Program will change these values automatically as the design progresses. User cannot change hidden beam width.
  Please note that you can only change Building information, SBC, Foundation Depth, Material Rate, Hidden beam and Flat Slab Depth values later. Other vital parameters cannot be changed, so be careful while giving initial info.
  The total floor width & length values will be used to tally the sum of individual Vertical and Horizontal Grids.
  The automatic creation of Joint Numbers & Co-Ordinate system depends up on total width, length & No. of vertical & horizontal Grids of floor.

  Now click the " Next Page" button, following window will appear.



- **I have entered the Horizontal Grid distance as 5000 mm for each Bay. The total is 30000 mm, which tally's with the total floor width of 30000 mm which was entered in the earlier page. If there is a mis-match between the two then an error will be displayed. A user can click " Previous Page " button to display the previous page & verify the required total width. Note that distance between vertical Grids means horizontal distance. Start from leftmost grid by referring to the Floor Plan.**

  If all grid distances are same then a user can enter the grid distance once & use " Copy All " button to copy the values to all ROWS.

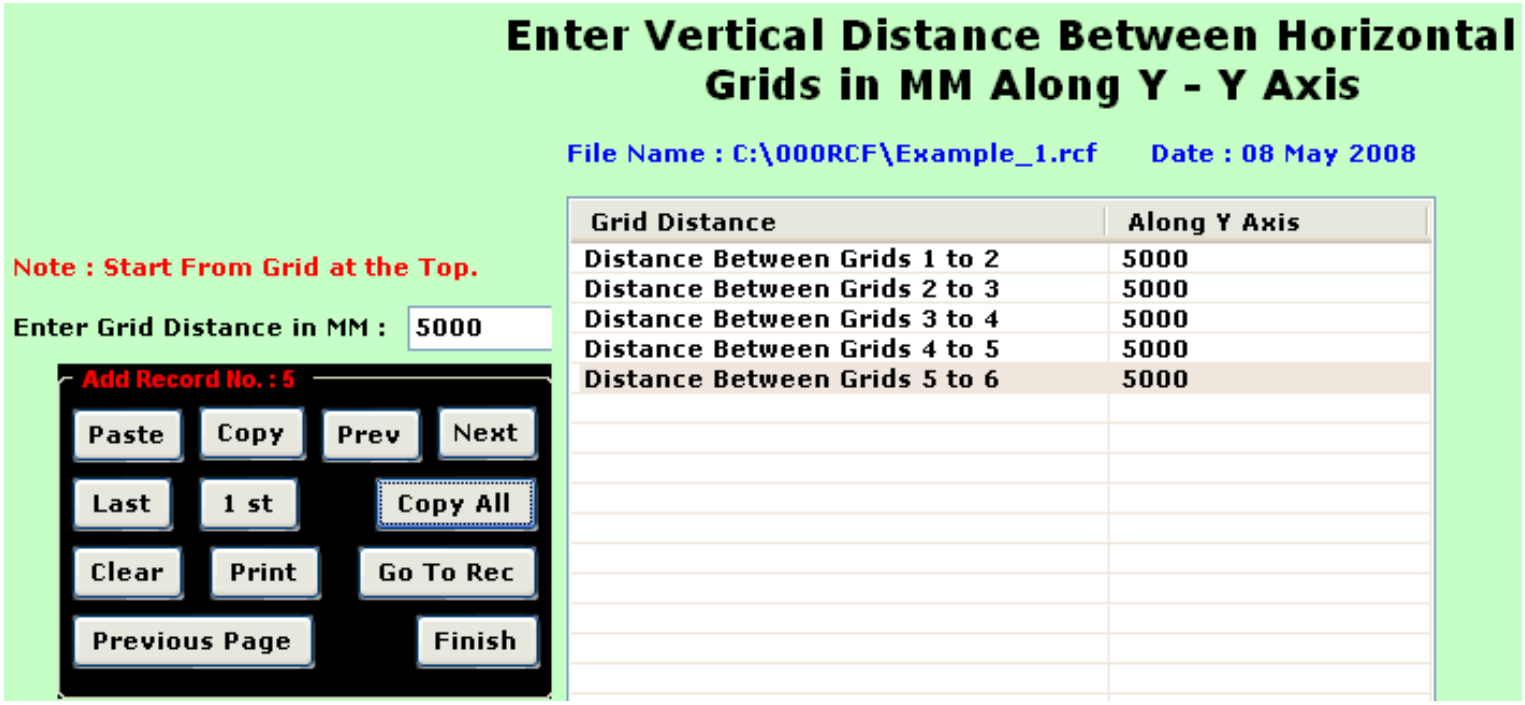
  Use Copy & Paste Button to copy & paste values to different rows, in case the grid distances are not same.

  The " Prev ", " Next ", " Last ", " 1 st ", & " Go to Rec " Buttons are for displaying / Focusing the cursor on Previous, Next, First or required Record Number.

  The " Clear " Button clears all grid Distance values.

  The " Print " Button is for printing of values from the Table. Use laser OR Inkjet Printer.

  Now click the " Next Page " button, following window will appear.



- **I have entered the Horizontal Grid distance as 5000 mm for each Bay. The total is 25000 mm, which tally's with the total floor width of 25000 mm which was entered in the earlier page. If there is a mis-match between the two then an error will be displayed. A user can click " Previous Page " button to display the previous page & verify the required total width. Note that distance between Horizontal Grids means Vertical distance from Top Down. Start from Top Left grid by referring to the Floor Plan.**

If all grid distances are same then a user can enter the grid distance once & use " Copy All " button to copy the values to all ROWS.

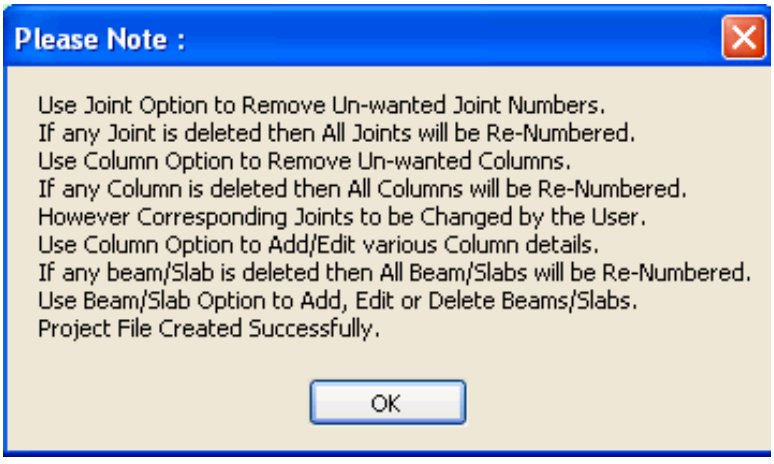
Use Copy & Paste Button to copy & paste values to different rows, in case the grid distances are not same.

The " Prev ", " Next ", " Last ", " 1 st ", & " Go to Rec " Buttons are for displaying / Focusing the cursor on Previous, Next, First or required Record Number.

The " Clear " Button clears all grid Distance values.

The " Print " Button is for printing of values from the Table. Use laser OR Inkjet Printer.

Now click the " Finish " button, following window will appear.



- **Note the above very important message.**
  If any joint no. is deleted then Joint numbers will be re-numbered.
  Delete the corresponding Columns, Beams & Slabs. Now the Columns, Beams & Slabs will be automatically re-numbered.
  Now user should manually change the Joint Numbers of Columns. Similarly RHS & LHS joint numbers of Beams should be changed manually as per the revised (Re-Numbered) joint numbers.

- **If a User would like to see the Project File Once again just click Edit / Display Project File Option. Note that Only Building information, SBC, Foundation Depth, Material Rates, Hidden beam and Flat slab depth can be edited. Note Hidden Beam Depth = Flat Slab Depth.**

STEP NO. 1 IS OVER.

LEARN FLAT SLAB STEP BY STEP

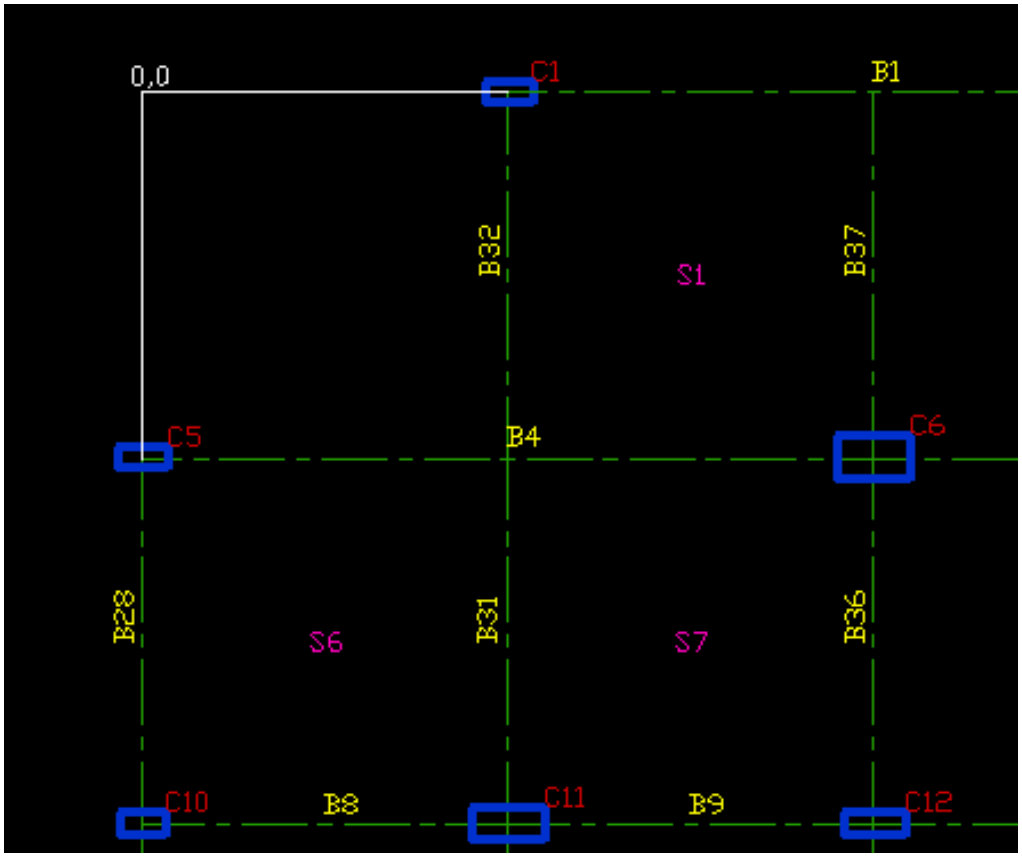
STEP NO. 2 (Alternate) : Scan Joint, Beam, Column & Slab Data from AutoCAD Drawing

In order to Read the AutoCAD drawing in FLAT SLAB , the various drawing components should be drawn in their respective layers as shown below.

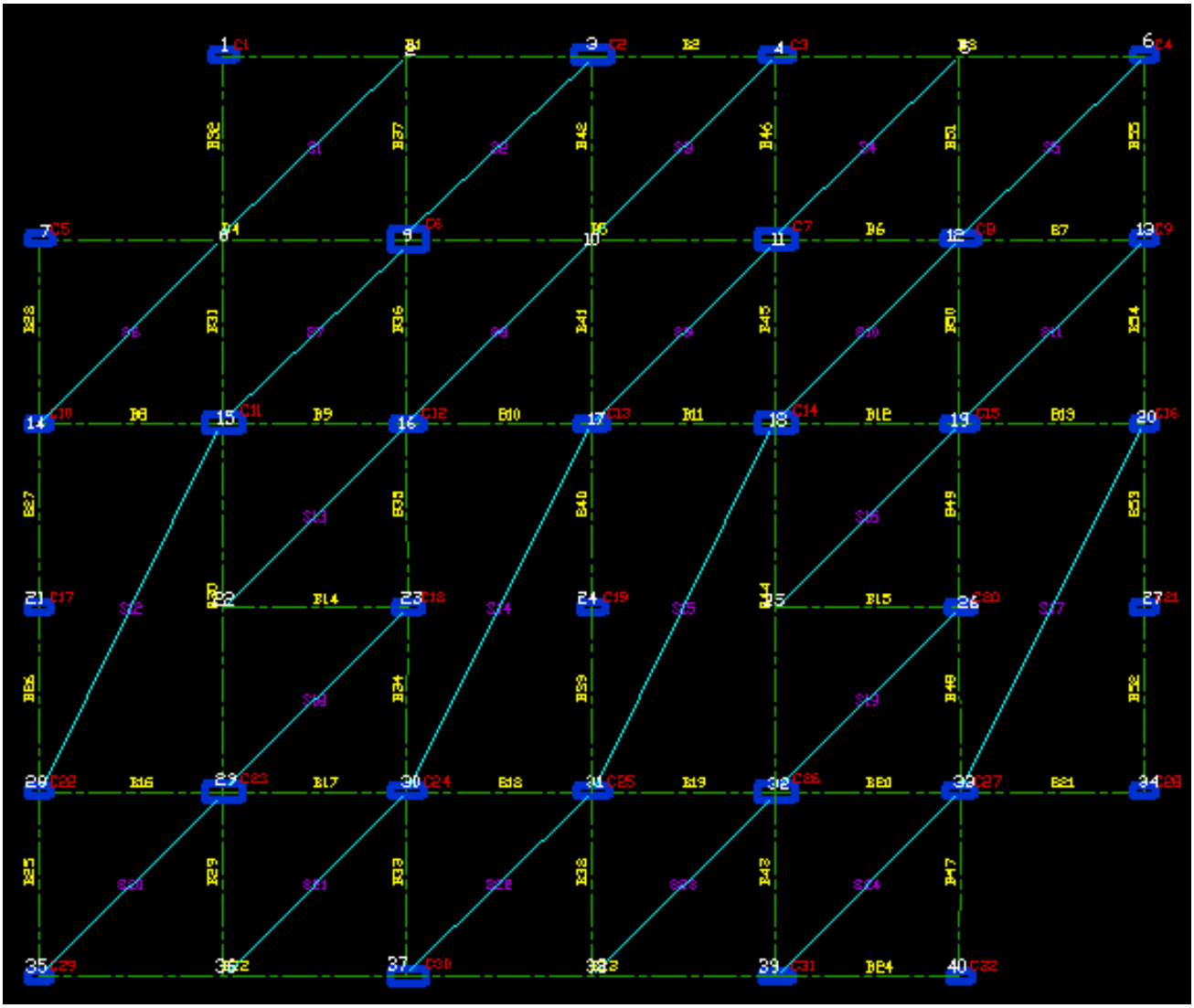
- **The Drawing Components to be drawn to exact scale and in Millimeter (MM).**

During the course of a project, a Floor can be extended by adding new Joints, Beams, Columns and Slabs.

Note that the plan should be drawn, such that the coordinate of Top Left corner should be located / shifted (in case of existing drawing) at 0,0 as shown below.



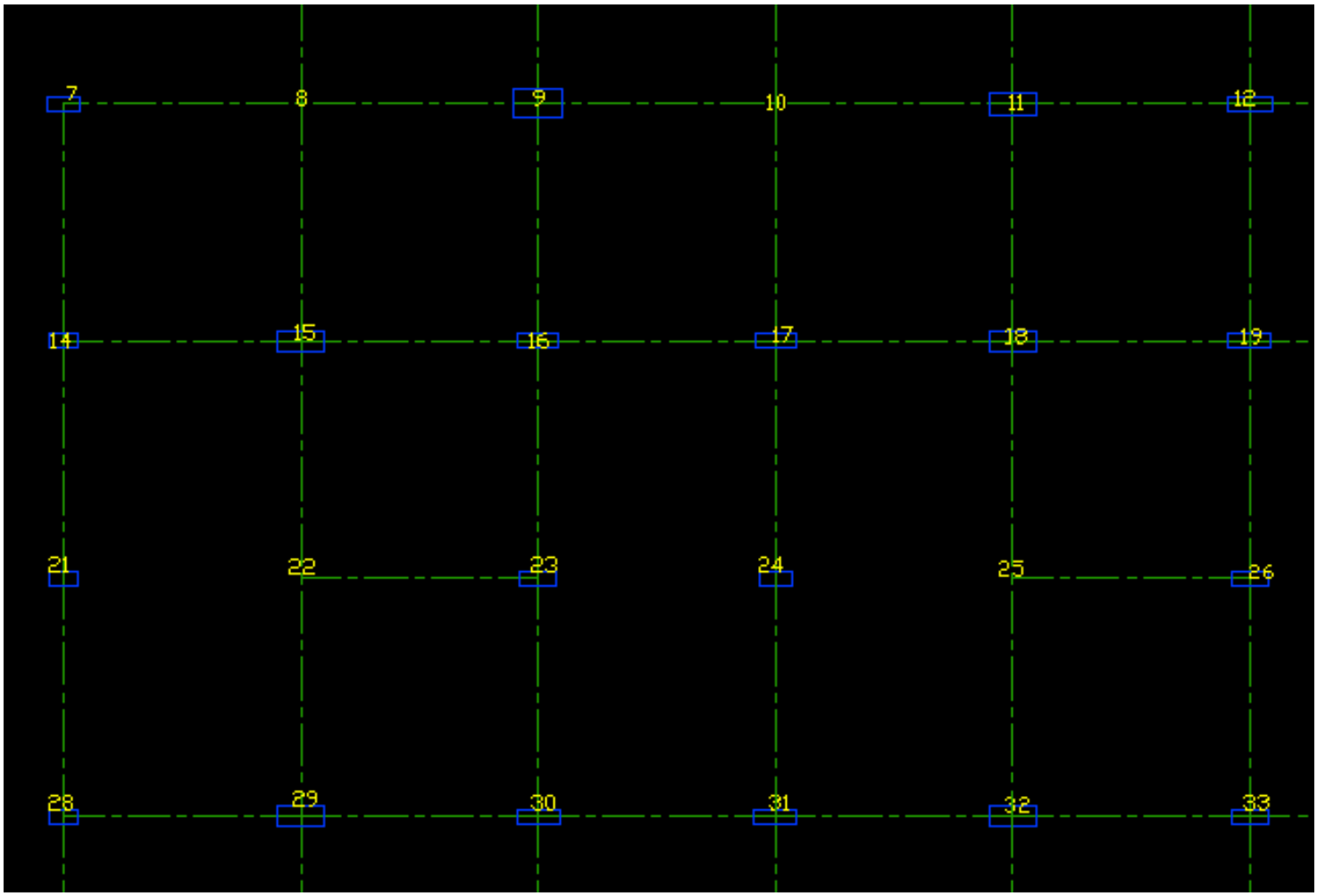
Shown below is a Typical RCC Plan in AutoCAD :



The Layers are explained as follows:

JOINTS

A Joint represents a column location or an intersection between 2 beams.
All Joint Numbers should be in the Layer JOINTS
Draw text using 'Single Line Text' option in AutoCAD.
Joint Nos should not be repeated.
Joints should be Serially Numbered.
Joint Nos should not have any Prefix.
If a Joint No is deleted, then the consecutive joint nos should be serially Re-Numbered.
However a Joint can be added at any time by giving the Joint number as last Joint No. + 1

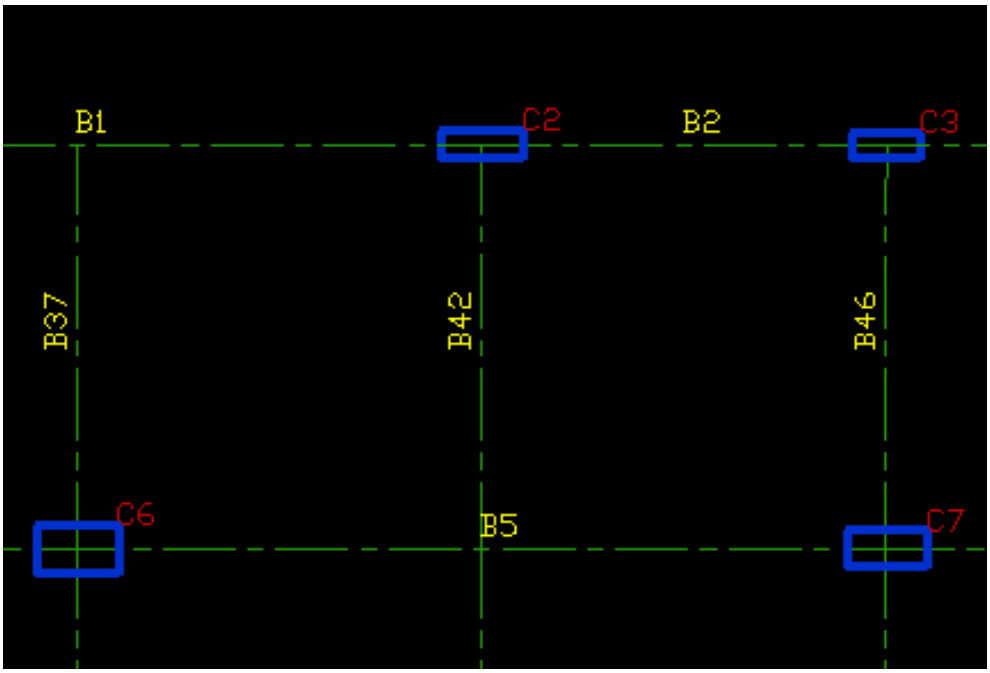


BEAM

All Beam Lines should be drawn under Layer CEN.
Only the Beam Centre line is to be drawn.
Beams to be drawn at 0 or 90 degrees only.
Inclined Beams are not permitted.
Keep "ORTHO" Option ON while drafting.
Every Beams should be a complete line touching Beam /Column Centre.
Every line in layer 'CEN' will be considered as a beam.
Beam Width will not be scanned from AutoCAD Drawing.
User to indicate Beam Width using Beam Option.
If a Beam is deleted, then the consecutive Beam Nos should be serially Re-Numbered.
However a Beam can be added at any time by giving the Beam number as last Beam No. + 1

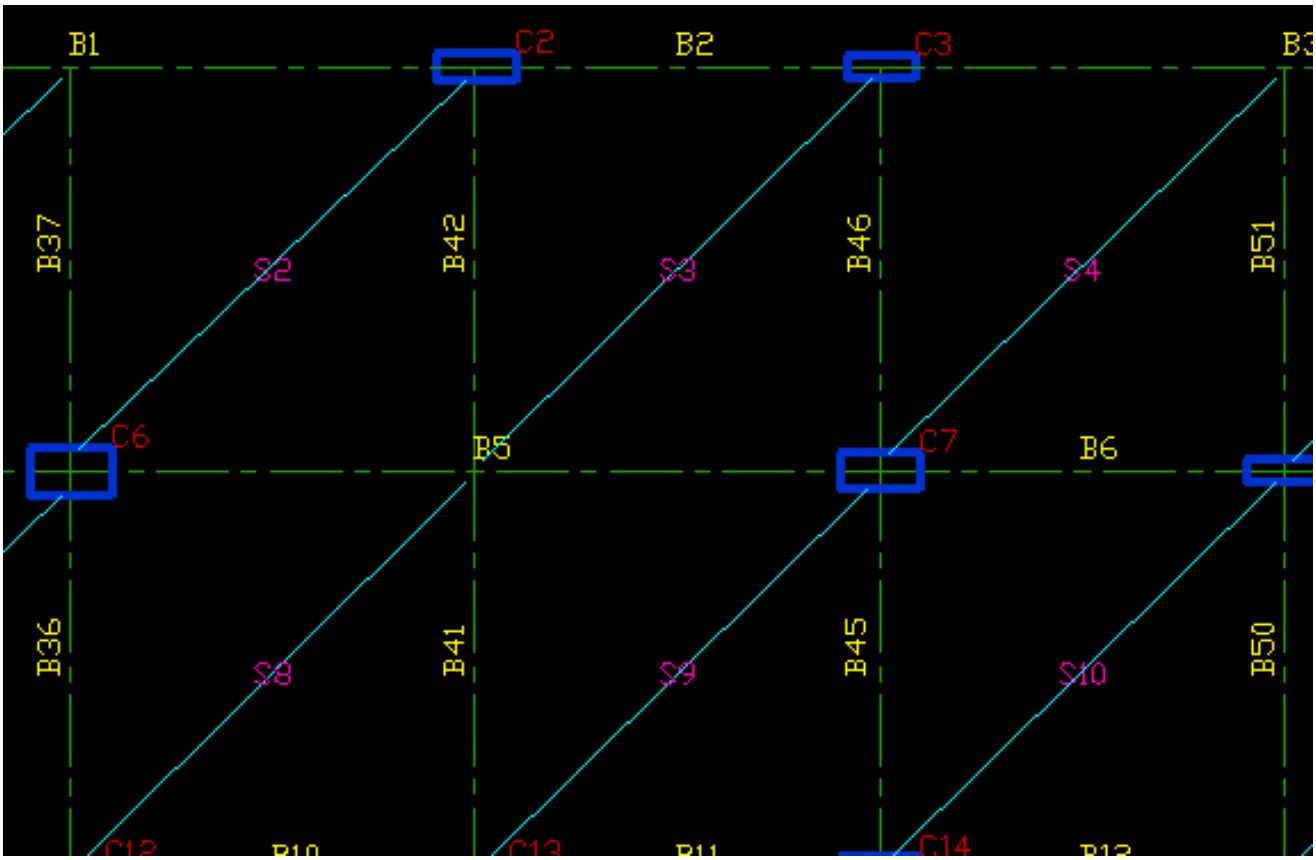
BEAM NUMBERS

All Beam Numbers should be in the Layer BEAMTEXT.
Draw text using 'Single Line Text' option in AutoCAD.
The angle of Inclination of Beam No's should be the same as the Beam.
(ie. If the Beam is inclined at an angle of 90 degrees, the text of the beam should also be inclines at 90 degrees.
Beam nos should be as close as possible to the centre of the Beam Line.
Beam Nos should not be repeated.
Beams should be Serially Numbered.
Beam Nos should be prefixed with a "B" (ie. B1, B2)



SLAB

In Order to mark the Extent of Slab, a Diagonal Line should be drawn from left bottom corner to right top corner of Slab as shown below.
The Diagonal Lines are to be drawn in the layer SLAB
Diagonal Lines should be drawn intersecting Beams or Columns.
If a Slab is deleted, then the consecutive Slab Nos should be serially Re-Numbered.
However a Slab can be added at any time by giving the Slab number as last Slab No. + 1



SLAB NUMBERS

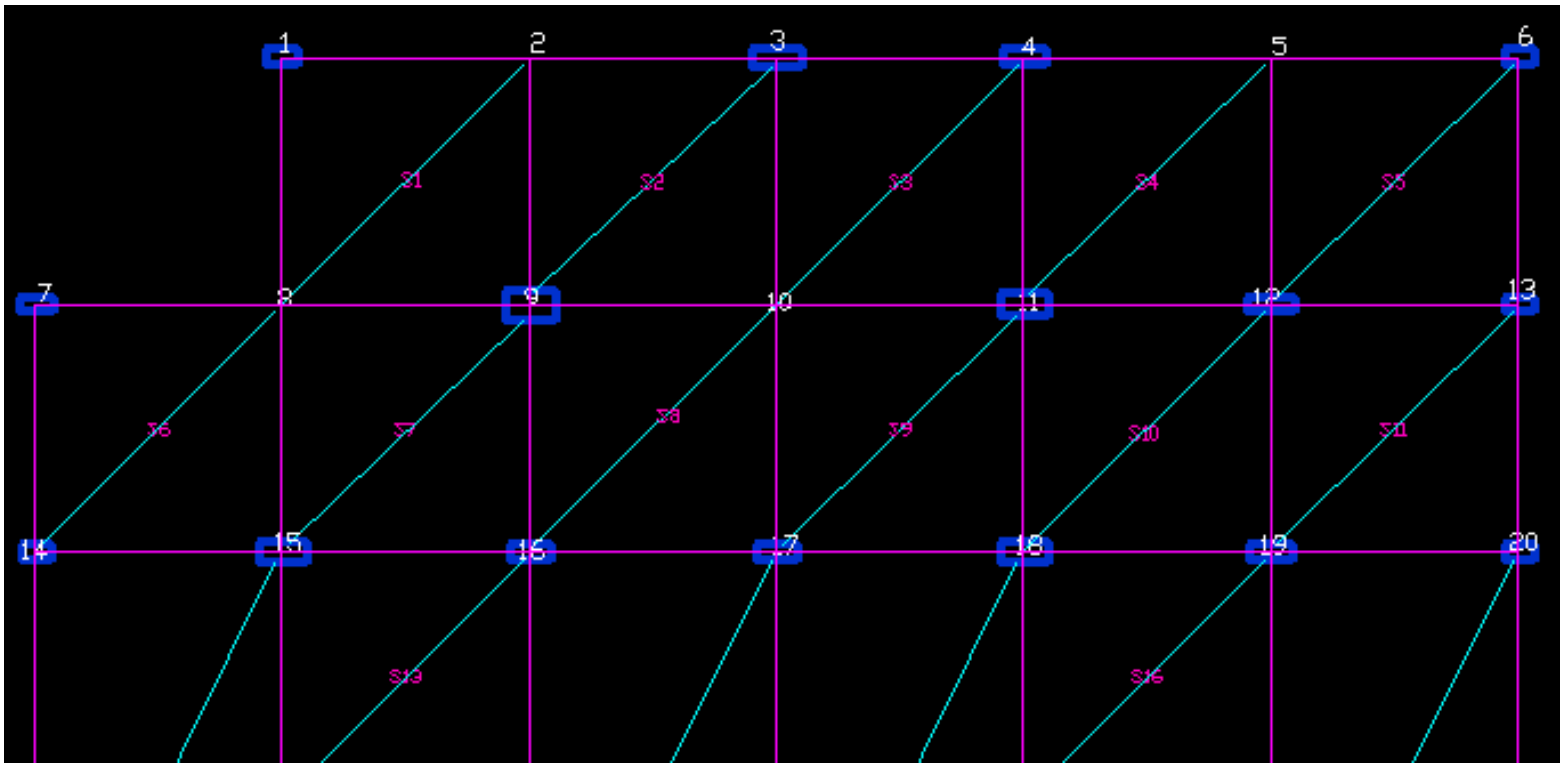
All Slab Numbers should be in the Layer SLABTEXT.
The Slab Text (No.) to be drawn near to the centre of the Slab .
Draw text using 'Single Line Text' option in AutoCAD.
Slab Nos. should not be repeated.
Slabs should be Serially Numbered.
Slab Nos should be prefixed with a "S" (ie. S1, S2)
Slab Text shall not be inclined.
It should be drawn at zero degrees.

COLUMN NUMBERS

All Column Numbers should be in the Layer COLUMNTEXT.
Column Nos should be as marked near its Joint.
Draw text using 'Single Line Text' option in AutoCAD.
Column Nos should not be repeated.
Columns should be Serially Numbered.
Column Nos should be prefixed with a "C" (ie. C1, C2)
Column Size will not be scanned from AutoCAD Drawing.
User to indicate Column Size in Column Option.
If a Column is deleted, then the consecutive Column Nos should be serially Re-Numbered.
However a Column can be added at any time by giving the Column number as last Column No. + 1

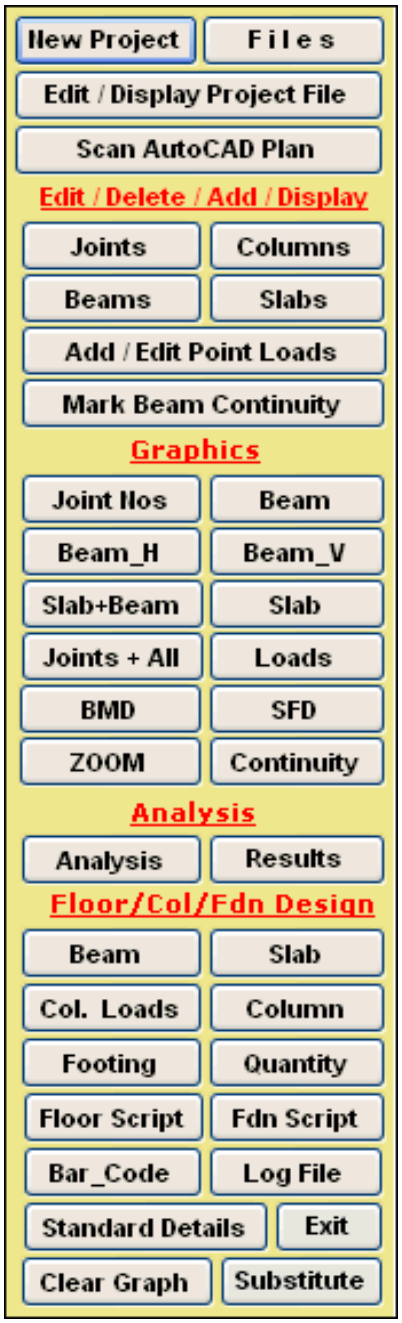
CONTINUITY

All Continuity lines should be drawn in the Layer CNT.
In the Image below, Continuity is marked in magenta.
Beams B1, B2 and B3 are continuous, hence continuiti should be marked from Joint 1 to Joint 6 and not break at any point.
Beams which are not marked as continuous will be treated as simply supported.



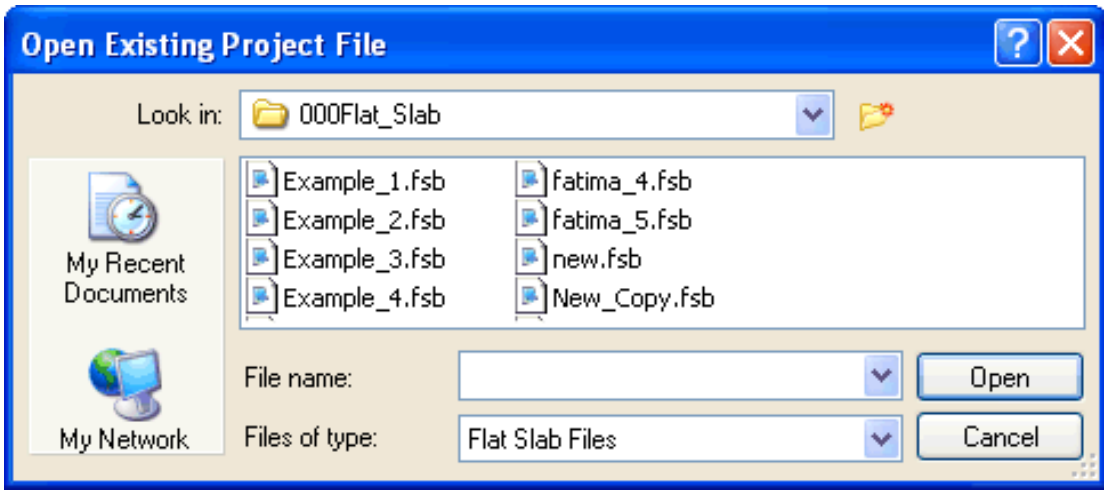
- **Once the drawing is completed, save the drawing in AutoCAD's DXF Format.**

- **Now Start FLAT SLAB.**

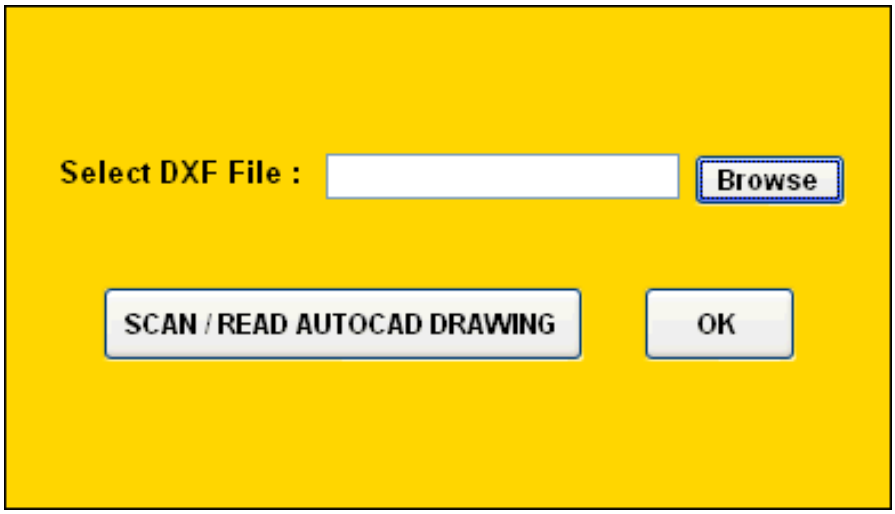


- **When Program starts, the graphics above is displayed.**

  Click the " Scan AutoCAD RCC Plan" option in the MENU bar.
  The following window will open.



- **Now select Example _1.fsb File.**
  Following Graphics will be displayed.



- **Click on browse to select the AutoCAD Drawing.**
  Next click on "Scan/ Read AutoCAD Drawing" button.

The Imported data shall be verified using Edit/ Delete/ Add/ Display Joint, Beam, Column and Slab as well as Graphics Option of Joint, Beam, Column and Slab.
The Left hand side Joint No, Right hand side Joint No and Span of Beams should be throughly checked using Add/ Edit Beam Option.
The Left hand side Joint No and Right hand side Joint No of Continuous Beams should be throughly checked using Mark Beam Continuity Option.
The Graphic Display and AutoCAD Drawing should appear same.
Do not perform analysis, if there is any discrepancy in drawings shown in various Graphic Options and AutoCAD.

Note: An Architectural Drawing can also be modified and used as an input drawing by making few changes as below :

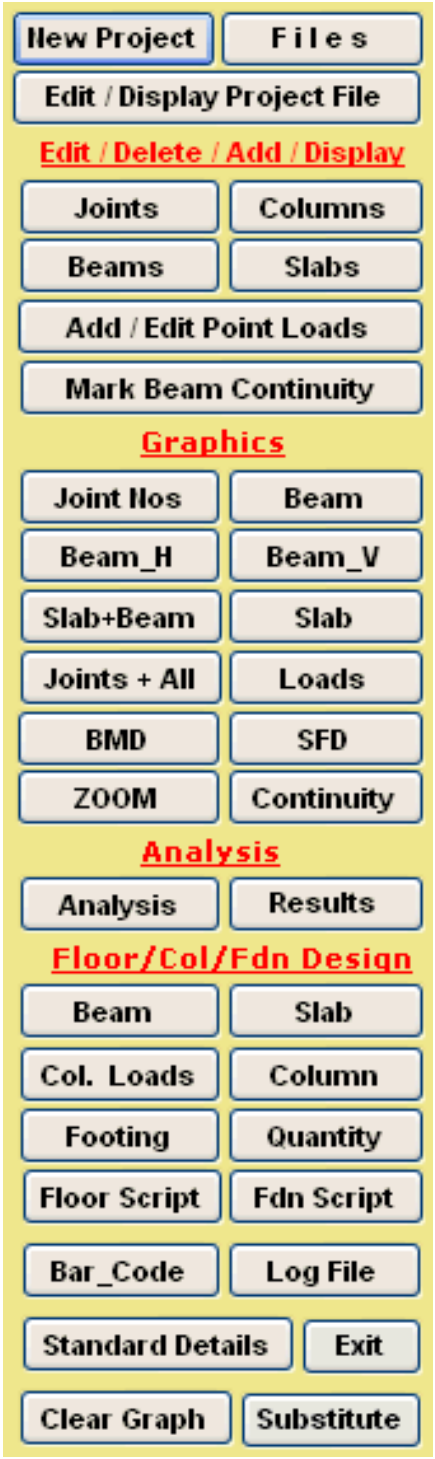
	1. The Wall Centre line may be used as Beam Centre Line. **Place these lines in CEN Layer.** **Draw the Beam Nos in BEAMTEXT layer.**
	2. Draw the Joints in JOINTS layer.
	3. Columns are usually marked in Architectural Plan. **Draw the Column Nos in COLUMNTEXT layer.**
	4. Draw Slab Diagonal lines in the layer SLAB and Draw the Slab Nos in layer SLABTEXT.
	5. Mark Beam Continuity in the layer CNT.
	6. Move the Top Left Corner of the Plan to (0,0) Coordinate, by using the 'MOVE' command of AutoCAD. **Save the Drawing in DXF Format.**

STEP NO. 2 IS OVER.

go back page top print

LEARN FLAT SLAB STEP BY STEP

STEP NO. 2 : Automatic Joint Number Creation

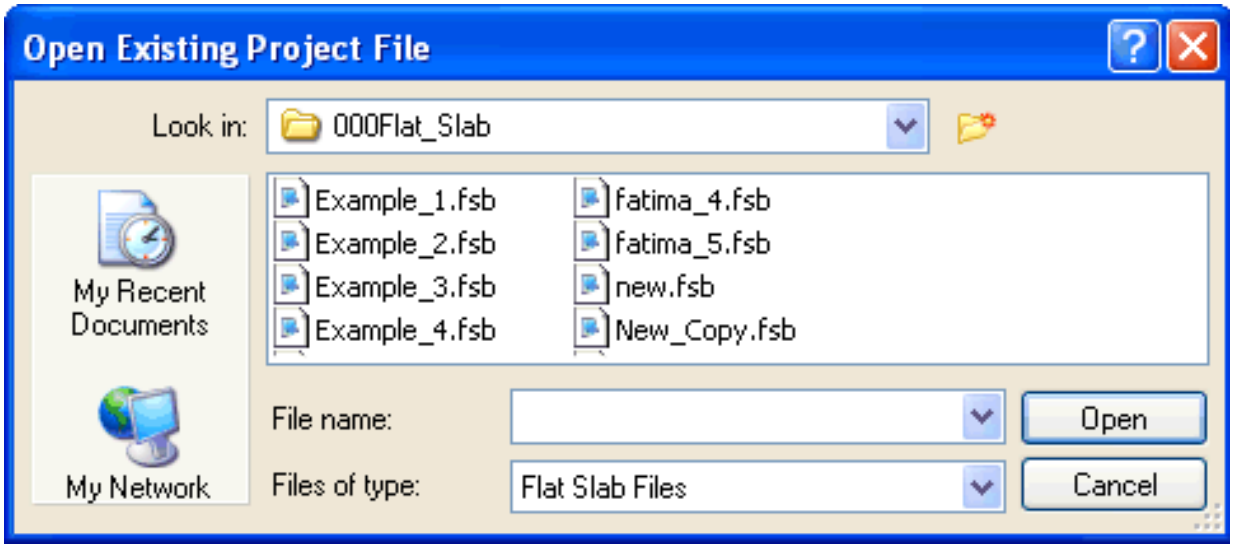


- **When Program starts, the Menu above is displayed. Under the Graphics Heading following options are displayed.**

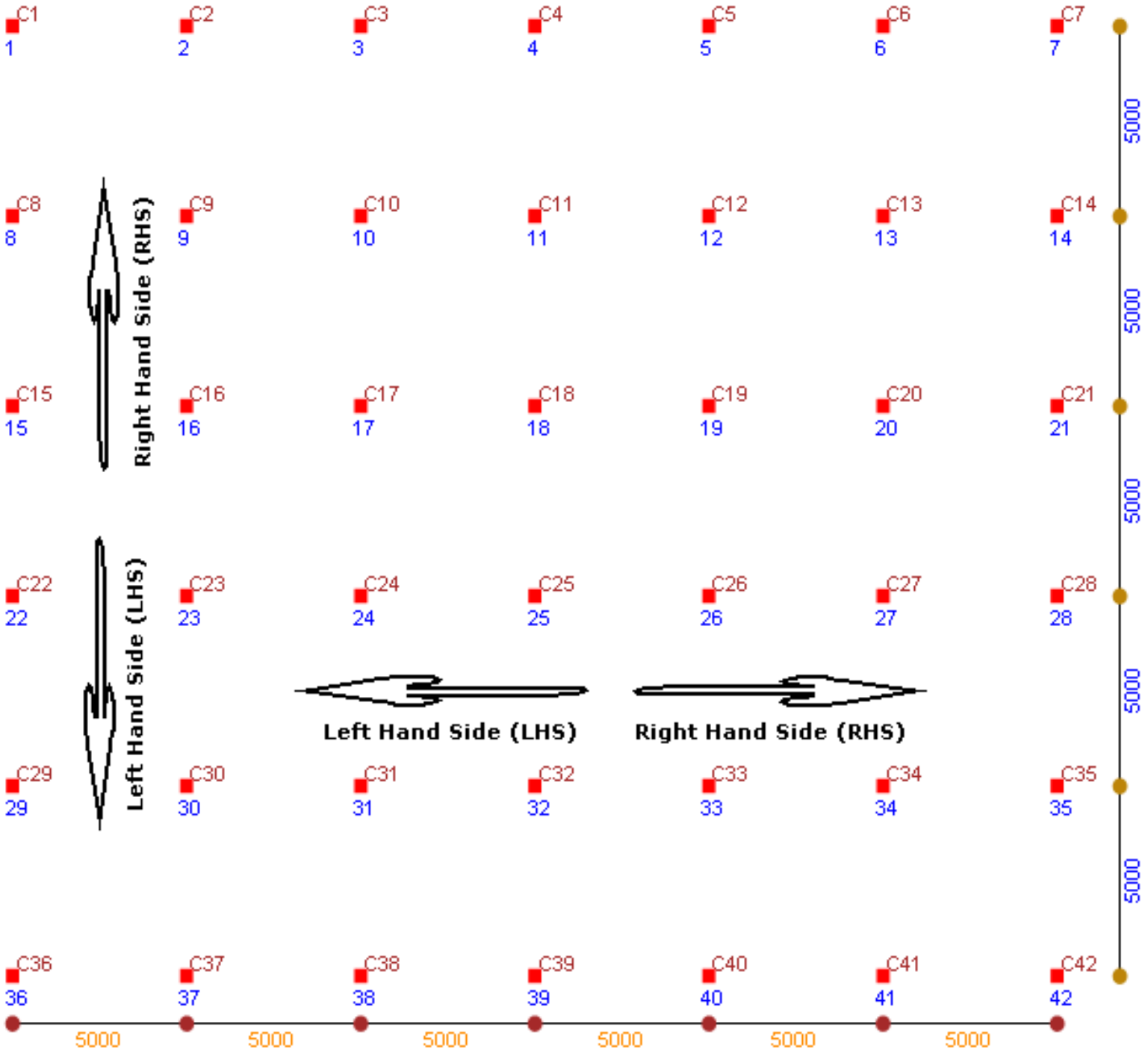
• Joint Nos
• Beam
• Beam_H (For Display of Only Horizontal Beams).
• Beam_V (For Display of Only Vertical Beams).
• Slab + Beam (Beams, Slabs & Columns are displayed).
• Slab (Only Slabs & Columns are displayed).
• Joints + ALL (For Display of Joints, Columns, Beams & Slabs)
• Loads (Display of Slab, Point Loads & Reactions from Secondary Beams, to be used after Analysis, and Design options have been successfully Run).
• BMD (Display of Bending Moment Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.
• SFD (Display of shear Force Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.
• Zoom (Display of part of Floor Plan under Selection).
• Continuity (Display of Beams Marked as Continuous.)
• etc...

Now Click on " Joint Nos " option.

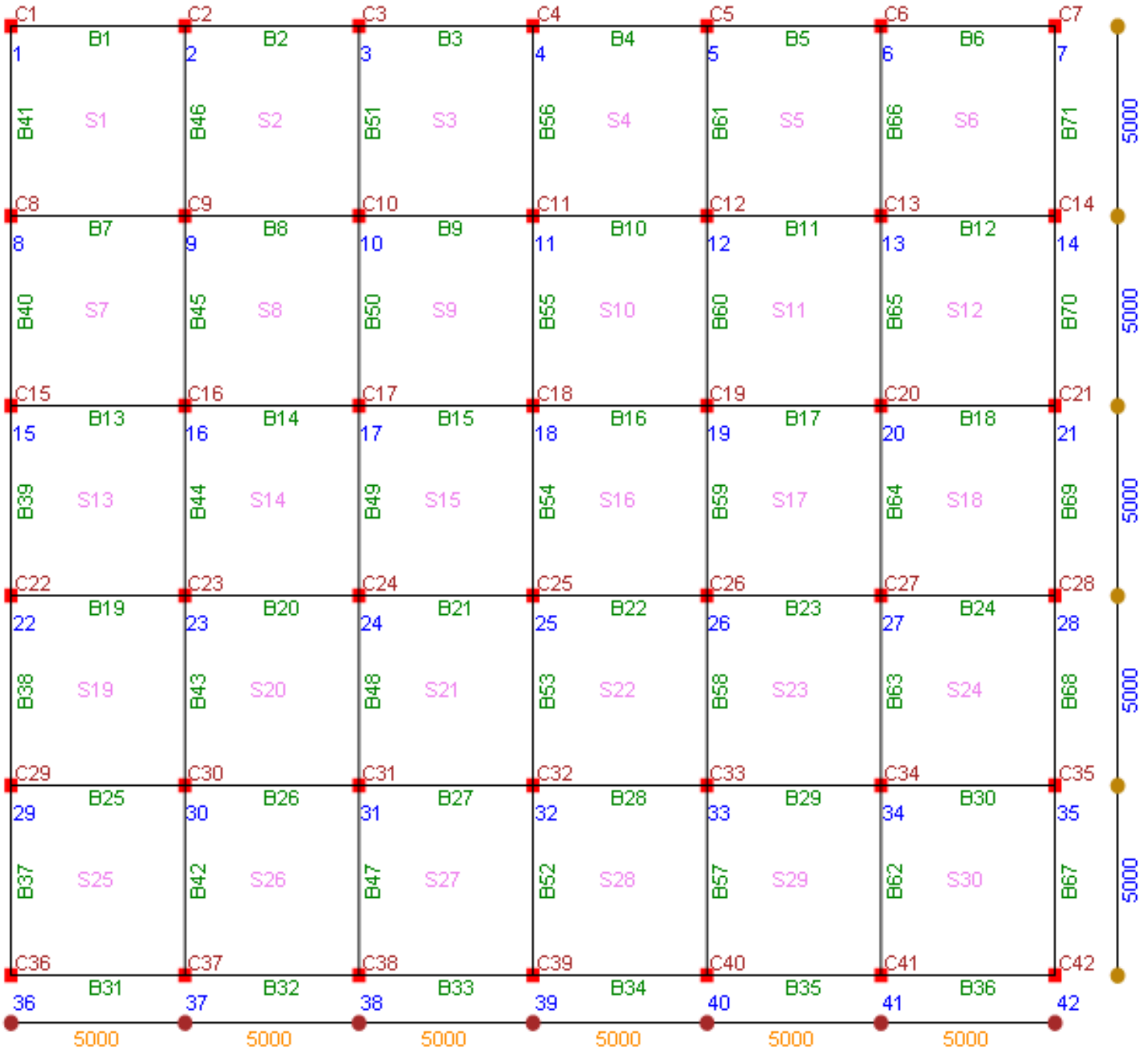
Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
Following Graphics will be displayed.

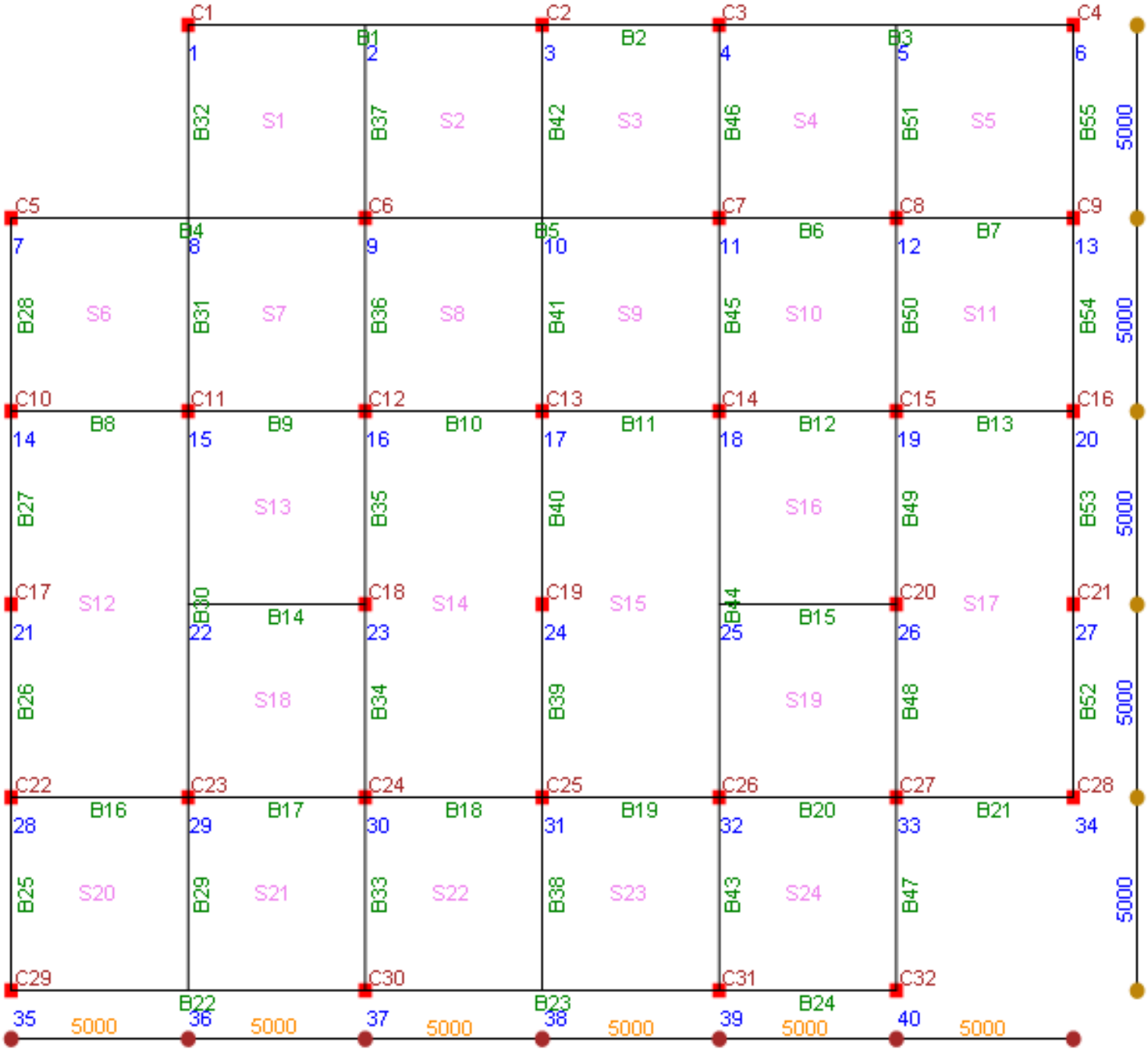


- **Note that Joints Numbers (Including X & Y Co-Ordinates) and Columns are created and displayed automatically at all the intersections of vertical & horizontal grids. Some of the Joint numbers may not be required. A Joint represents a column location or an intersection between 2 beams. The beams are represented by its location in the form of Right Hand Side (RHS) & Left Hand Side (LHS) Joint numbers. The slabs are represented by TOP LEFT & RIGHT BOTTOM joint numbers.**
  Additionally we have displayed above RHS and LHS conventions for Horizontal & Vertical Orientations in the form of Arrows.
  Now click the " Joints + ALL " button, following Graphics will be displayed.



AUTOMATICALLY GENERATED FLOOR PLAN

- **Note that Columns are shown at all the Joints, and Beams are spanning between these columns.**
  This is different than the required Floor Plan. The intended actual floor plan is reproduced below.



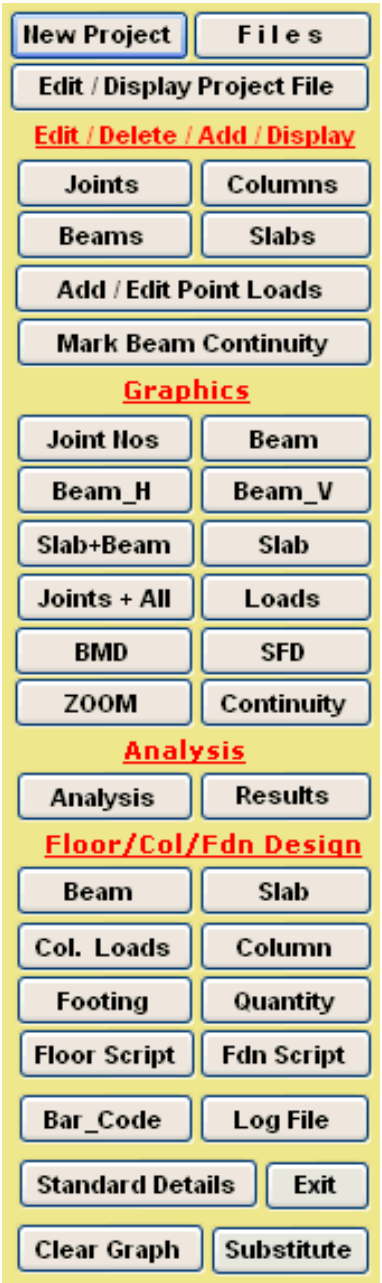
ACTUAL REQUIRED FLOOR PLAN

- **Our Actual RCC Floor Plan has only 24 numbers of Slabs, 32 numbers of Columns and 55 numbers of Beams. The automatic generated plan has 30 numbers of Slabs, 42 numbers of Columns and 71 numbers of Beams. Hence we have to delete these extra Slabs, Columns and Beams along with their appropriate Joint numbers.**
  Let us delete these parameters in next step.

STEP NO. 2 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 3 : Delete Un-Wanted Joints

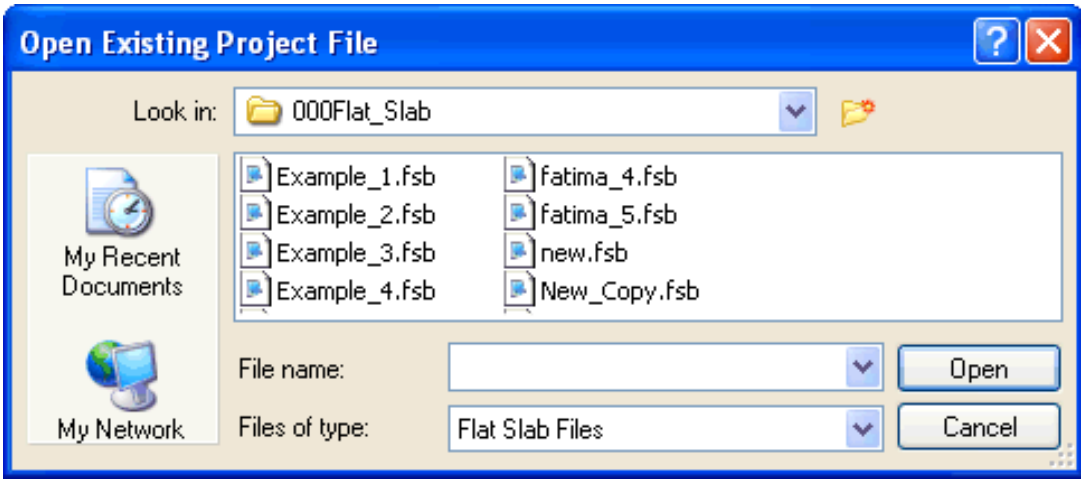


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Joints " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.

DISPLAY / EDIT / ADD JOINT NUMBERS

File Name : C:\000RCF\Example_1.rc Date : 09 May 2008

Note : Origin (0,0) is at Top Left Corner.

Joint No. 1

X Co_Ordinate 0

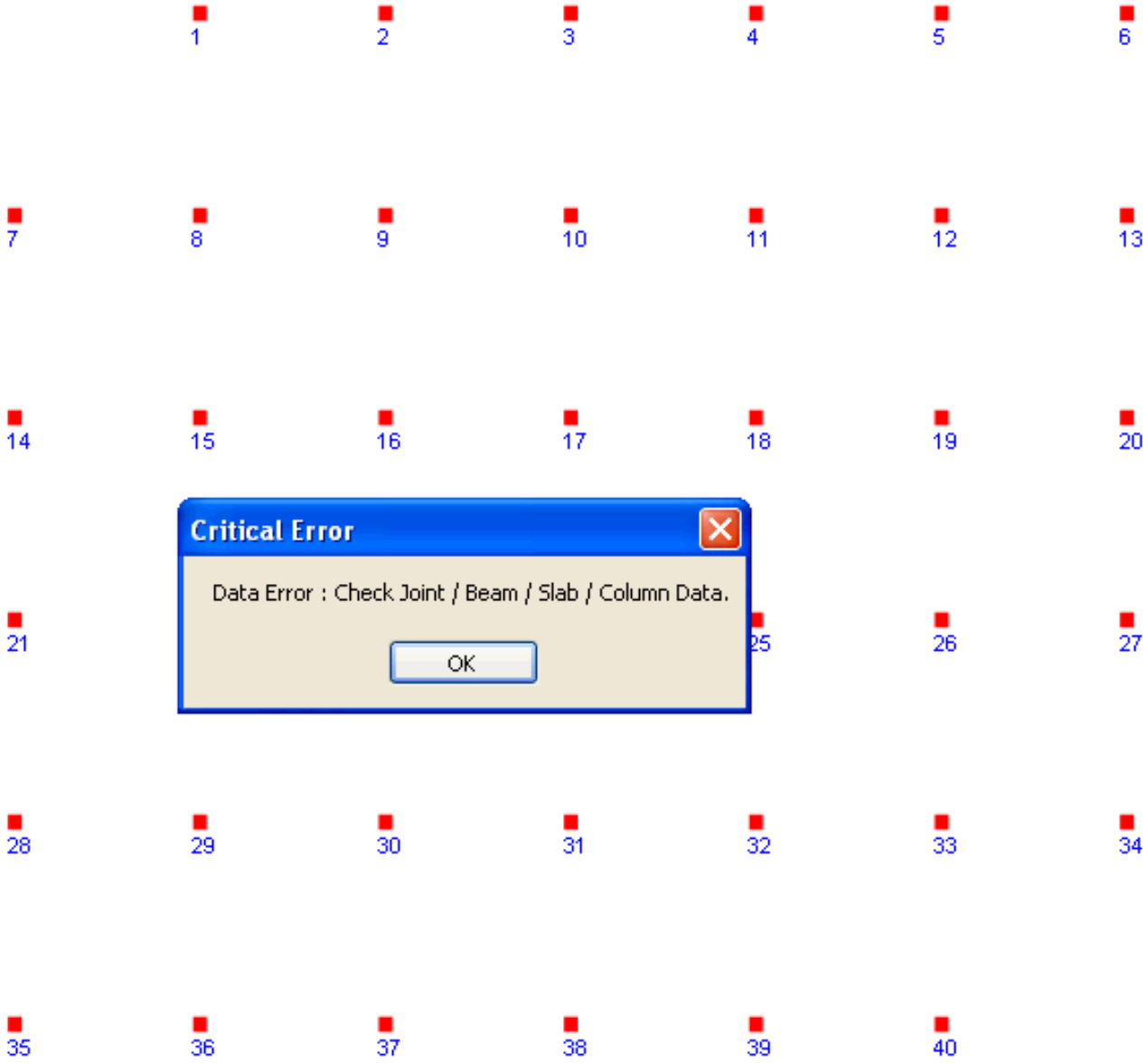
Y Co_Ordinate 0

Record No. : 1 of 42

Read Me | Prev | Next | Paste | Copy | Last | 1 st | Copy All | Update | Go To Rec | Remove | Add Record | Clear | Print | O K

Joint No.	X Co-Ordinate in MM	Y Co-Ordinate in MM
1	0	0
2	5000	0
3	10000	0
4	15000	0
5	20000	0
6	25000	0
7	30000	0
8	0	5000
9	5000	5000
10	10000	5000
11	15000	5000
12	20000	5000
13	25000	5000
14	30000	5000
15	0	10000
16	5000	10000
17	10000	10000
18	15000	10000
19	20000	10000
20	25000	10000
21	30000	10000
22	0	15000
23	5000	15000
24	10000	15000
25	15000	15000
26	20000	15000
27	25000	15000
28	30000	15000
29	0	20000
30	5000	20000
31	10000	20000
32	15000	20000
33	20000	20000

- **We have to delete joint numbers " 1 " and " 42 ". Just Select Joint Number " 1" Row & press " Remove " button. Joint Number " 1 " is deleted. Similarly select Joint Number " 42 " & press remove button. Joint no. " 42 " is deleted. Click Update button, you will notice that all Joints are re-numbered. By repeatedly Deleting & Updating, even a complex floor plan can numbered appropriately. To achieve this a copy of actual & automatic generated plan should be in front of you.**
  Now Click on " Joint Nos " option under the Graphics Caption. You will see the revised Joint number Layout as displayed below.



- **Note the Critical Data Error " Check Joint / Beam / Slab / Column data ".**
  What it means is that you have not deleted corresponding Beam (s) / Slab (s) / Column (s) which refers to deleted Joints.

  The " Copy All " button copies data from the selected ROW to all the ROWS. Later on a user can change the values selectively.

  Use Copy & Paste Button to copy & paste values to different rows, in case the values are not same.

  The " Prev ", " Next ", " Last ", " 1 st ", & " Go to Rec " Buttons are for displaying / Focusing the cursor on Previous, Next, First or required Record Number.

  The " Clear " Button clears all values.

  The " Print " Button is for printing of values from the Table. Use laser OR Inkjet Printer.

  The " Add Record " button is very important one. If a user has deleted any joint by mistake, than he can easily add the record back by pressing this button. However the Joint number added will be the last + one number. Suppose after deleting a joint, total joints left are 99, then if "Add Record" button is pressed, the next record displayed will be joint number 100. Remember that a user cannot give joints " X " and " Y " Co-Ordinates outside the boundary limit as set out in the project file (Refer Step No. 1). In our " Example_1 " Project the maximum width is 30000 and maximum length is 25000.

  If a user is not comfortable with automatic generation of joint numbers (Co-Ordinates) , then he can use Add Record option to enter complete joint data & corresponding Co-Ordinates manually by first clearing the old data by pressing " Clear " button. Similarly Add Record button can be used for effectively where a floor plan is rather complex, having lots of internal secondary beams in either direction.

- **Now click the " Read Me " button, the following important messages are displayed.**

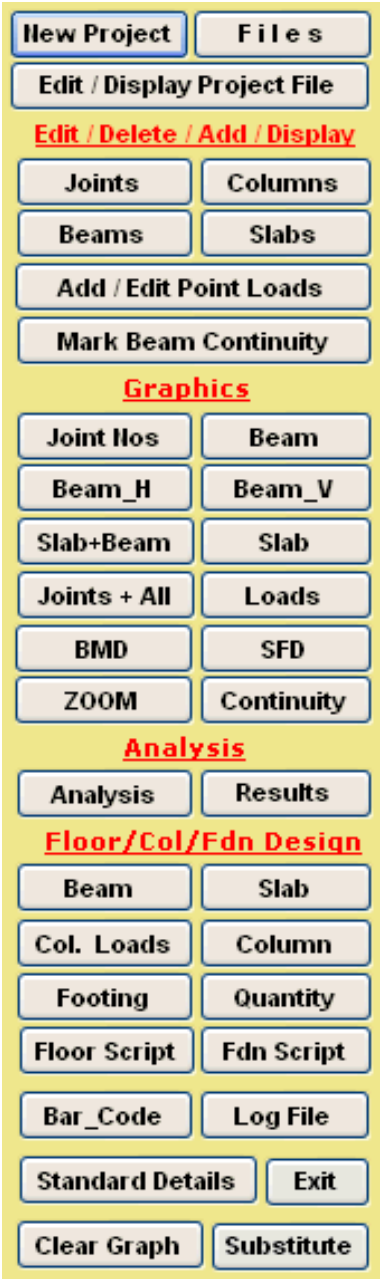
  1. Origin (0,0) is at Top Left Hand Corner. Co-Ordinates Cannot be Negative.
  2. There shall not be any difference in Maximum Horizontal & Vertical Distance between Project File & Joint File.
  3. Joint Number should start with 1 & not 0.
  4. Joints Numbers cannot be repeated.
  5. Co-ordinates cannot be repeated.
  6. Max. Joints Number = Max. Record Number.
  7. Joints should be Serially Numbered.
  8. Use Add Button to Append Record.
  9. Use Update Button to Re-Number & Save Your Work.
  10. In case any Joint # is Deleted or Edited then, Do not Forget to Edit Corresponding Column, Beam & Slab to reflect above change.

- **Now we have come to the end of Step # 3.**
  In the next step we will delete the un-wanted Beams.

STEP NO. 3 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 4 : Delete & Edit Hidden Beams

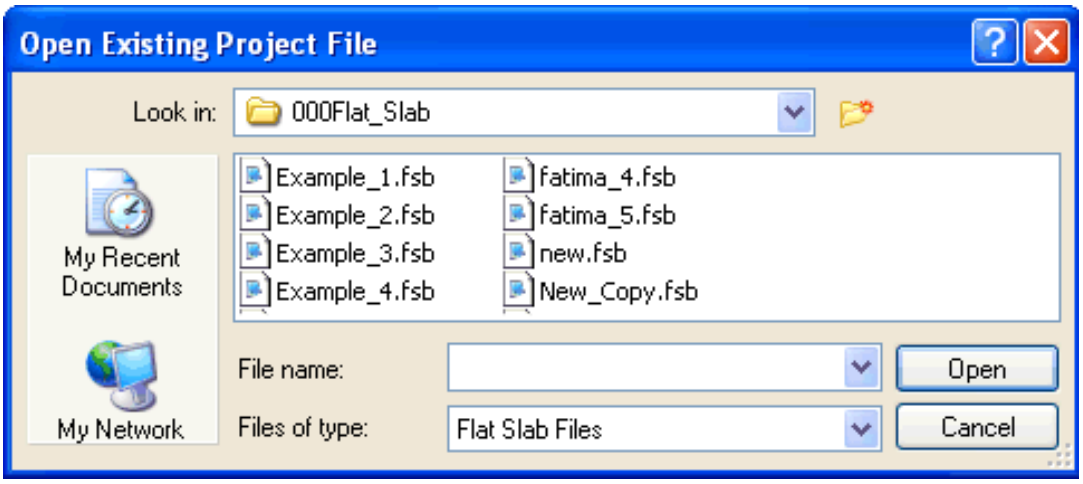


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Beams " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.

DISPLAY / EDIT / HIDDEN BEAM DETAILS

File Name : D:\000Flat_Slab\Example_1.fsb Date : 20 March 2011

Beam #	LHS Joint #	RHS Joint #	Width	Depth	Masonry Ht	Masonry Thk	Extra UDL
B1	1	3	1250	360	2.55	230	
B2	3	4	1250	360	2.55	230	
B3	4	6	1250	360	2.55	230	
B4	7	9	2500	360	2.55	230	
B5	9	11	2500	360	2.55	230	
B6	11	12	1250	360	2.55	230	
B7	12	13	1250	360	2.55	230	
B8	14	15	1250	360	2.55	230	
B9	15	16	1250	360	2.55	230	
B10	16	17	1250	360	2.55	230	
B11	17	18	1250	360	2.55	230	
B12	18	19	1250	360	2.55	230	
B13	19	20	1250	360	2.55	230	
B14	22	23	1250	360	2.55	230	
B15	25	26	1250	360	2.55	230	
B16	28	29	1250	360	2.55	230	
B17	29	30	1250	360	2.55	230	
B18	30	31	1250	360	2.55	230	
B19	31	32	1250	360	2.55	230	
B20	32	33	1250	360	2.55	230	
B21	33	34	1250	360	2.55	230	
B22	35	37	1250	360	2.55	230	

Record No. : 1 of 55

Beam # B1 LHS Joint # 1 RHS Joint # 3 Beam Width in MM 1250 Beam Depth in MM 360

Net Height of Brick Wall in M 2.55 Thickness of Wall in MM 230 Additional UDL on Beam in T/M

Read Me | Prev | Next | Copy | Paste | 1 st | Last | Copy All Span 10000

Update | Go To Rec | Remove | Add Record | Print | Clear | O K

- **Here we have 71 numbers of Hidden Beams. Actual required are only 55 numbers of Beams (Refer Step No. 1 - Actual Required Floor Plan). Go down to the last beam number B71 and press " Remove " button. You will notice that Beam B71 is deleted. Similarly delete the next beam, till you reach Beam number B55. I am deleting from the end (Last Beam) for ease of editing, you can even start from the beginning or from any other beam number.**
  Click " Update " button. This will re-number all the beams if required.
  Now let us start editing the RHS & LHS Joint numbers of Beams. Go to first Beam B1 & Select it (Click with Cursor), or click the " 1 st " button.
  Now concentrate on the Text Boxes below. Beam # will be shown as B1. LHS Joint # is shown as 1 and RHS joint # is shown as 2. Change RHS Joint # to 3 by editing the text box.
  Again select Beam # B2 or Click " Next " button. RHS Joint # is shown as 2, change it to 3.
  LHS Joint # is shown as 3, change to 4.
  Similarly edit the rest of Beam's RHS & LHS Joint numbers as required by our Actual Floor Plan.

  In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.
- **All other Beam Parameters Viz; Masonry Height, Masonry Thickness, and Any Extra UDL can be Added / Edited for individual Beams by clicking at respective Text Boxes.**
  Beam Span is displayed in Yellow Text Box.
  Hidden Beam width is automatically calculated by the Program. Hidden beam depth can be changed using Project Edit option.
- **Now click the " Read Me " button, the following important messages are displayed for guidance.**

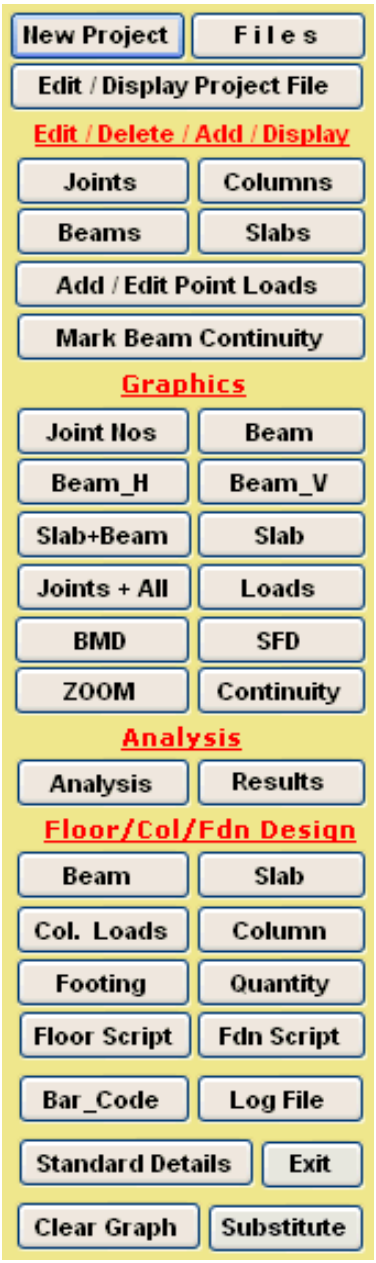
  1. Add Joint Details before Beams.
  2. Hidden Beam Number should start with 1 & not 0.
  3. Hidden Beam Numbers cannot be repeated.
  4. Beam LHS & RHS Joint #s cannot be repeated.
  5. Hidden Beam Depth < 200 mm not allowed.
  6. Max. (LHS or RHS) Beam Joint # cannot > Max. Joint File #.
  7. Use Add Button to Append Record.
  8. Use Update Button to Re-Number & Save Your Work.
  9. Max. Beam Number = Max. Record Number.
  10. Beam Nos. Shall be Numbered Serially.
  11. Beam LHS OR RHS Joint Number Cannot < = 0.0
  12. LHS : Left Hand Side, RHS : Right Hand Side.
  13. If Beam is Vertical then, LHS Y-Co Ordinate > RHS Y-Co Ordinate.
  14. If Beam is Horizontal then, LHS X-Co Ordinate < RHS X-Co Ordinate.
  15. In Order to Change Hidden beam Thickness Use Project Edit Option.

- **Now we have come to the end of Step # 4.**
  In the next step we will Delete and Edit un-wanted Columns.

STEP NO. 4 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 5 : Delete & Edit Columns

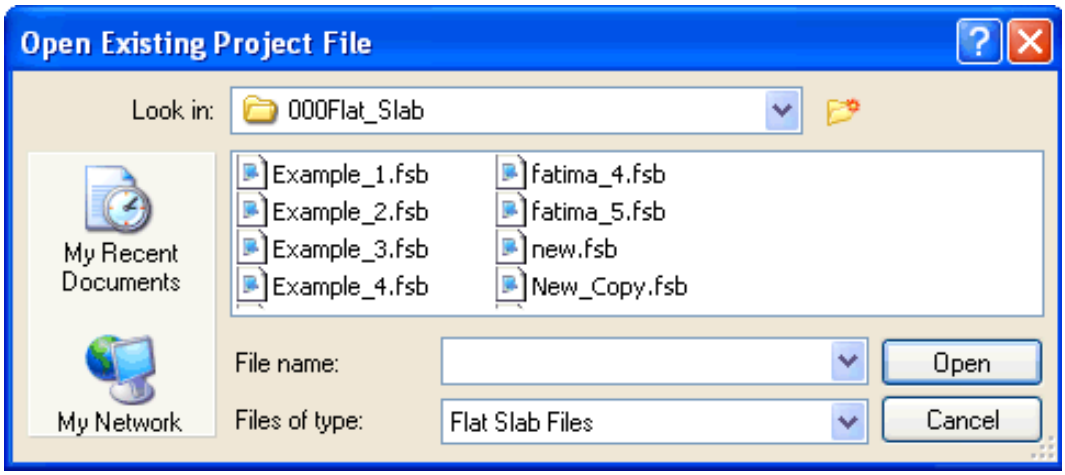


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Columns " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.

DISPLAY / EDIT / COLUMN DETAILS

Column #	Joint #	BM X-X	BM Y-Y	X-X Dim	Y-Y Dim	Leff X-X	Leff Y-Y	% Steel	Steel Face
C1	1			600	300	3	3	0.8	Y
C2	3			600	300	3	3	0.8	Y
C3	4			600	300	3	3	0.8	Y
C4	6			600	300	3	3	0.8	Y
C5	7			600	300	3	3	0.8	Y
C6	9			600	300	3	3	0.8	Y
C7	11			600	300	3	3	0.8	Y
C8	12			600	300	3	3	0.8	Y
C9	13			600	300	3	3	0.8	Y
C10	14			600	300	3	3	0.8	Y
C11	15			600	300	3	3	0.8	Y
C12	16			600	300	3	3	0.8	Y
C13	17			600	300	3	3	0.8	Y
C14	18			600	300	3	3	0.8	Y
C15	19			600	300	3	3	0.8	Y
C16	20			600	300	3	3	0.8	Y
C17	21			600	300	3	3	0.8	Y
C18	23			600	300	3	3	0.8	Y
C19	24			600	300	3	3	0.8	Y
C20	26			600	300	3	3	0.8	Y
C21	27			600	300	3	3	0.8	Y
C22	28			600	300	3	3	0.8	Y
C23	29			600	300	3	3	0.8	Y

Record No. : 1 of 32

Column # C1 Joint # 1 BM along X_X in t-m BM along Y_Y in t-m

Col. dim. along X_X in MM 600 Col. dim. along Y_Y in MM 300 Assumed % of Reinforcement 0.8

Eff. length along X_X in M 3 Eff. length along Y_Y in M 3 Is Steel Distributed on 2 Faces Y

Read Me | Prev | Next | Last | 1 st | Copy | Paste | Copy All

Limitations | Update | Go To Rec | Remove | Add Record | Print | Clear | O K

- **Here we have 42 numbers of Columns. Actual required are only 32 numbers of Columns. (Refer Step No. 1 - Actual Required Floor Plan). Go down to the last Column number C42 and press " Remove " button. You will notice that Column C42 is deleted. Similarly delete the next Column, till you reach Column number C32. I am deleting from the end (Last Column) for ease of editing, you can even start from the beginning or from any other Column number.**
  Click " Update " button. This will re-number all the Columns if required.
  Now let us start editing the Joint numbers of Columns. Go to first Column & Select it (Click with Cursor), or click the " 1 st " button.
  Now concentrate on the Text Boxes below. Column # will be shown as C1. Joint # is shown as 1, which is ok. Again select Column # C2 or Click " Next " button. Joint # is shown as 2, change it to 3.
  Similarly edit the rest of Column's Joint numbers as required by our Actual Floor Plan (Refer Step 2). In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.
- **All other Column Parameters Viz; X-X Dim, Y-Y Dim, Lxx, Lyy, BM_XX, BM_YY, % of Reinforcement, Steel Face Distribution (2 or 4 Faces : Y / N) & Orientation can be Added / Edited for individual Columns by clicking at respective Text Boxes.**

  - **Click Limitations Button. A new window will open up displaying Permissible Column Size & Maximum Reinforcement % Table. The program designs building columns automatically, selecting size and % of reinforcement, within this displayed table.**
- **Now click the " Read Me " button, the following important messages are displayed for guidance.**

1. Column Number should start with 1 & not 0.
2. Column Numbers cannot be repeated.
3. Column Joint #s cannot be repeated.
4. Column Width / Depth < 200 mm not allowed.
5. Max. Column Joint # cannot > Max. Joint File #.
6. Use Add Button to Append Record."
7. Max. Column Number = Max. Record Number.
8. Columns Shall be Numbered Serially.
9. Use Update Button to Re-Number & Save Your Work.
10. Column Joint Number cannot be < = 0.0.
11. Column Dimension along X-X means along X Axis (Horizontal).
12. Column Dimension along Y-Y means along Y Axis (Vertical).

Designer to Note the Following:

Designer to Calculate DL + LL Moments in Columns from both the Axis. The Width and Depth of Hidden Beam will be displayed after running Design option. Frame Analysis under DL + LL shall be performed along both the axis and Column Moments shall be entered using this Option.
If DL + LL Column Moments are not Entered then Design of Flat Slab will be in-correct.

Use any 2 / 3 D Frame Analysis Software or for Quick Results Use Our Own 2 D Frame Analysis Software to Perform Frame Analysis in Each Direction.

Beam Loads can be taken as tributary or UDL for Frame Analysis.

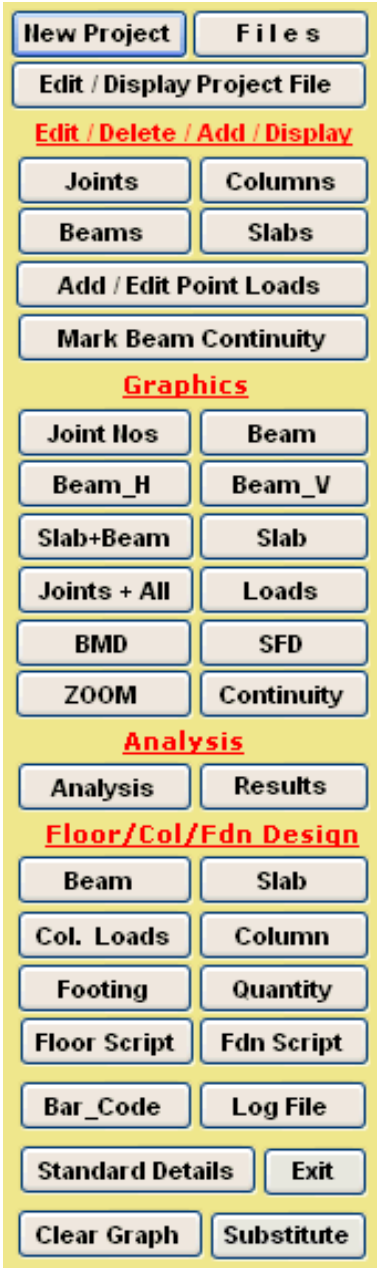
Flat Slab Design is meant for Vertical Loads only, for Lateral Loads Shear walls or Bracing Systems shall be Provided.

- **Now we have come to the end of Step # 5.**
  In the next step we will Delete and Edit un-wanted Slabs.

STEP NO. 5 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 6 : Delete & Edit Flat Slabs

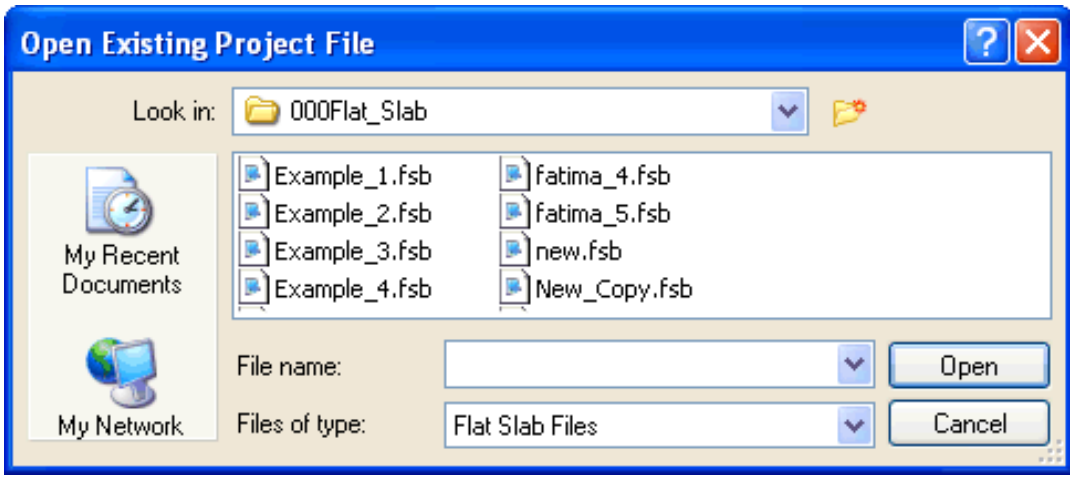


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Slabs " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.

DISPLAY EDIT SLAB DETAILS

Slab #	Left Btm Joint #	Right Top Joint #	Thickness	Live Load	Floor Finish	Ceiling	Partition
S1	8	2	360	0.20	40	20	0.10
S2	9	3	360	0.20	40	20	0.10
S3	10	4	360	0.20	40	20	0.10
S4	11	5	360	0.20	40	20	0.10
S5	12	6	360	0.20	40	20	0.10
S6	14	8	360	0.20	40	20	0.10
S7	15	9	360	0.20	40	20	0.10
S8	16	10	360	0.20	40	20	0.10
S9	17	11	360	0.20	40	20	0.10
S10	18	12	360	0.20	40	20	0.10
S11	19	13	360	0.20	40	20	0.10
S12	28	15	360	0.20	40	20	0.10
S13	22	16	360	0.20	40	20	0.10
S14	30	17	360	0.20	40	20	0.10
S15	31	18	360	0.20	40	20	0.10
S16	25	19	360	0.20	40	20	0.10
S17	33	20	360	0.20	40	20	0.10
S18	29	23	360	0.20	40	20	0.10
S19	32	26	360	0.20	40	20	0.10
S20	35	29	360	0.20	40	20	0.10
S21	36	30	360	0.20	40	20	0.10
S22	37	31	360	0.20	40	20	0.10
S23	38	32	360	0.20	40	20	0.10

Record No. : 1 of 24

Slab # S1 | Left Bottom Joint # 8 | Right Top Joint # 2 | Slab Thickness in MM 360 | 5000 x 5000

LL on Slab in T/M2 0.20 | Floor Finish in MM 40 | Ceiling Thk. in MM 20 | Partition Load in T/M2 0.10

Read Me | Prev | Next | Copy | Paste | Last | 1 st | Slab Intensity in T/M2 1.32

Copy All | Update | Go To Rec | Remove | Add Record | Print | Clear | O K

- **Here we have 30 numbers of Slabs. Actual required are only 24 numbers of Slabs (Refer Step No. 1 - Actual Required Floor Plan). Go down to the last Slab number S30 & press " Remove " button. You will notice that Slab S30 is deleted. Similarly delete the next Slab, till you reach Slab number S24. I am deleting from the end (Last Slab) for ease of editing, you can even start from the beginning or from any other Slab number.**
  Click " Update " button. This will re-number all the Slabs if required.
  Now let us start editing the LEFT BOTTOM & RIGHT TOP Joint numbers of Slabs. Go to first Slab S1 & Select it (Click with Cursor), or click the " 1 st " button.
  Now concentrate on the Text Boxes below. Slab # will be shown as S1. Left Bottom Joint # is shown as 8 & Right Top joint # is shown as 2. This is what we require, hence there is no change. Similarly no changes are required for slabs S2 to S5.
  Slab S6 requires correction. Change Left Bottom Joint # to 13 and Right Top Joint # to 7 by editing the text box. slab S12 are requires correction to 20,14 from 21, 15.
  Similarly edit the rest of Slab's Left Bottom & Right Top Joint numbers as required by our Actual Floor Plan (Refer Step 2).

  In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- **All other Slab Parameters Viz; LL, FF, CL and Partition Loads can be Added / Edited for individual Slabs by clicking at respective Text Boxes. Flat slab depth can be changed using Project Edit option. Slab Spans in either direction is displayed in Golden Color. Similarly Slab Intensity**
  in t/m2 is displayed in Golden Text Box.

- **Now click the " Read Me " button, the following important messages are displayed for guidance.**

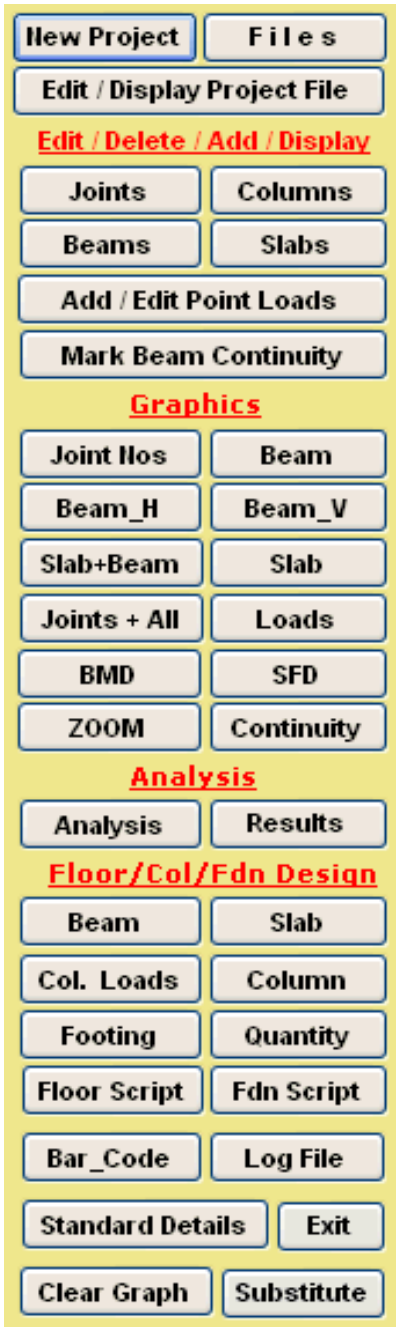
  1. Add Joint & Beam Details Before Slab.
  2. Slab Numbers cannot be < = 0.0 & repeated.
  3. Slab LHS & RHS Joint #s cannot be repeated.
  4. Slab Thickness > 600 and < 200 MM not allowed.
  5. Max. Slab Joint # cannot > Max. Joint File #.
  6. Use Add Button to Append Record.
  7. Use Update Button to Re-Number & Save Your Work.
  8. Max. Slab Number = Max. Record Number.
  9. Slabs shall be Numbered Serially.
  10. Slabs Joint (LB/RT) Numbers cannot be < = 0.0
  11. Slab Density = 2.5 T/M3, Plaster/FF Density = 2.0 T/M3.
  12. Any Cut-Out / Opening is not Permitted in Flat Slab design.
  13. In Order to Change Flat Slab Thickness Use Project Edit Option.

- **Now we have come to the end of Step # 6.**
  In the next step we will Add Point Loads to the Beams.

STEP NO. 6 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 7 : Add & Edit Point Loads to Hidden Beam

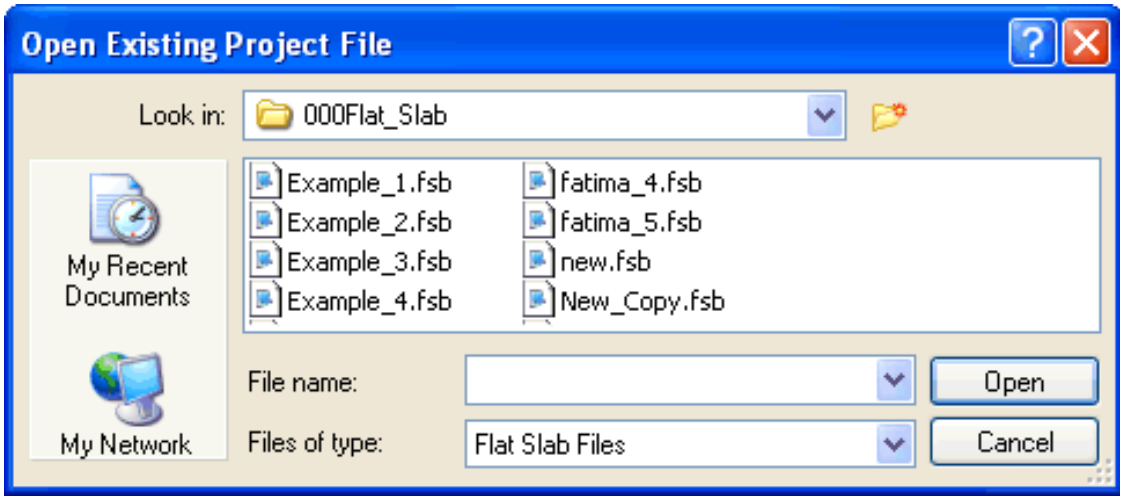


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

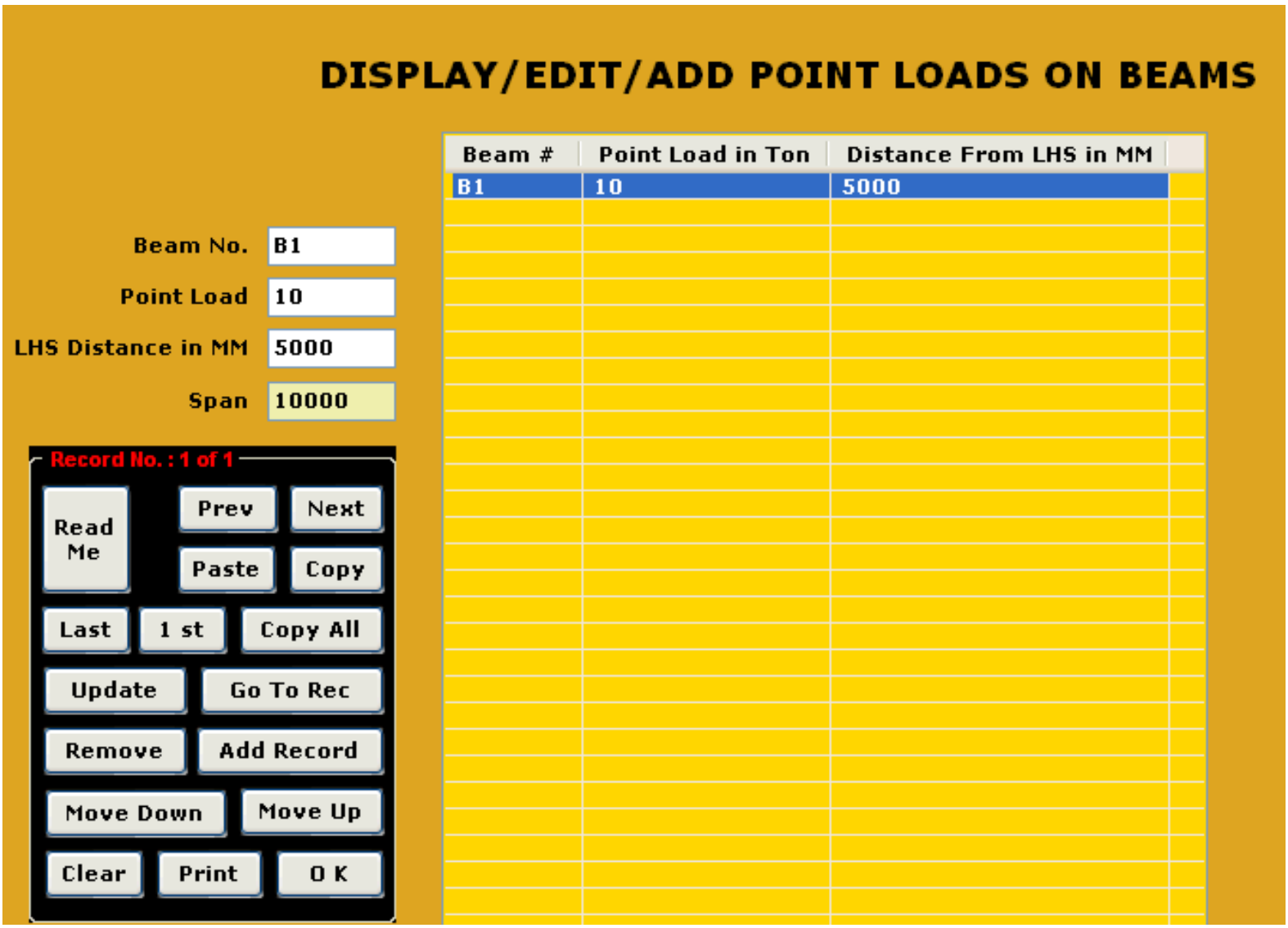
  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Add / Edit Point Loads " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.



- **Click " Add Record " button to Add Point Load to a Beam. When Add Record button is clicked,**
  Beam No. Text Box will show B1. You can edit Text Box to change this beam no.
  Enter required Externally Applied Point Load & its distance from Left. The distance should not exceed the Span as displayed just below.

  Just like any other option, here also a user can Display, Add, Edit & delete the Point Load records at the same time. The " Move Up " and " Move Down " buttons will move the record Up or Down the Table respectively. This is useful if you would like to keep the point loads on the same beam serially.

  You can add any number of point Loads. Do not repeat the same load & location.

  In case you would like to EXIT program after partial Adding / Editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- **Now click the " Read Me " button, the following important messages are displayed for guidance.**

  1. LHS & RHS Joint #s cannot be repeated.
  2. Enter Point Loads due to Externally Applied Loads Only.
  3. Reactions due to Secondary Beams are Calculated Automatically.
  4. Use Add Button to Append Record.
  5. Use Update Button to Save Your Work.

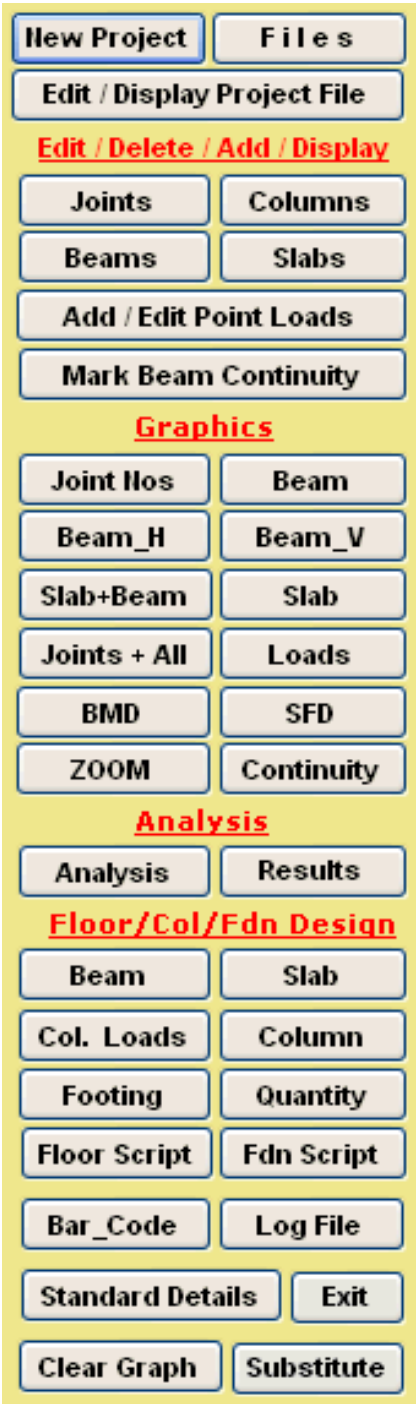
  Avoid Point Loads in Flat Slab Design.

- **Now we have come to the end of Step # 7.**
  In the next step we will Mark Beam Continuity.

STEP NO. 7 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 8 : Add & Edit Hidden Beam Continuity

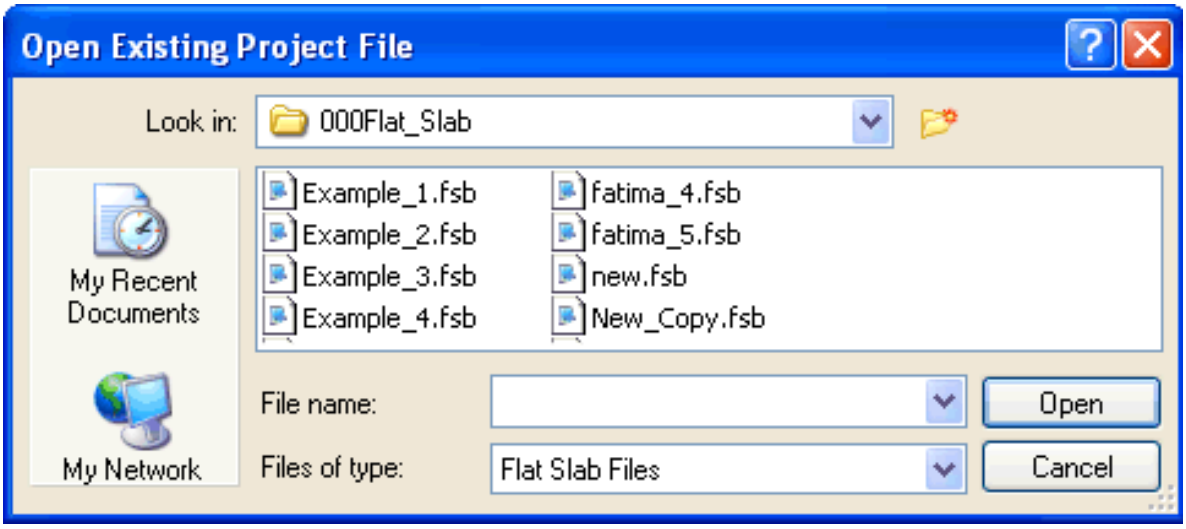


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

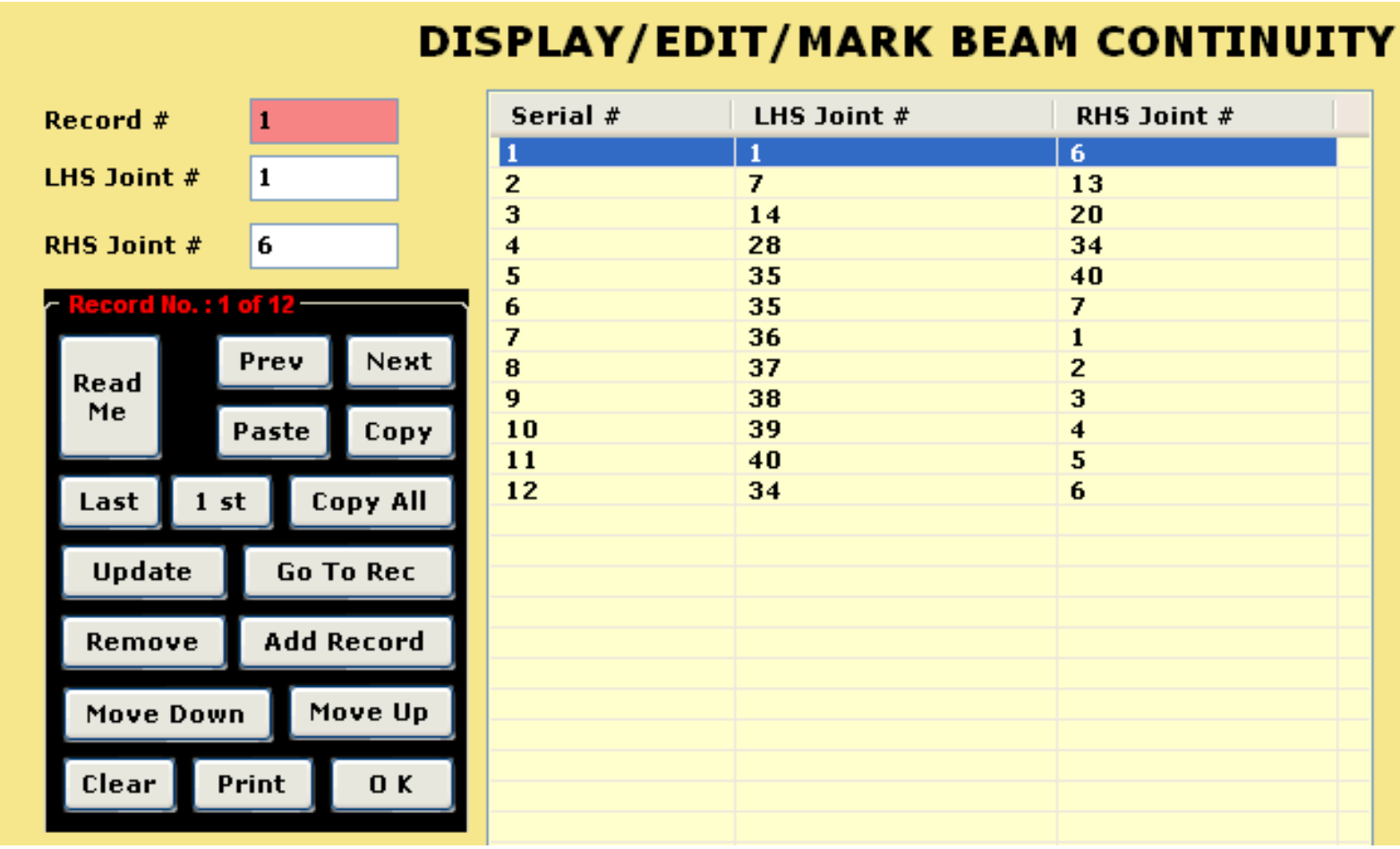
  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **Add / Edit Point Loads**
  - **Mark Beam Continuity**

  Now Click on " Mark Beam Continuity " option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Graphics will be displayed.



- Click " Add Record " button to Add a Continuous Beam. " 1 " will be displayed in the Text Box, When Add Record button is clicked. Refer our Actual Floor Plan (Step No. 2). Enter " 1 " & " 6 " in the corresponding Text Boxes of LHS Joint & RHS Joint. This means that Beams are continuous from Joint numbers 1 to 6 (B1, B2 & B3). Similarly Add all other continuous beams as I have Marked. If any Beam(s) is not marked as continuous than it will be treated as Simply Supported in Analysis. Note that Joints 22, 23 (Beam B14) & 25, 26 (B15) are not Marked as continuous.

  Just like any other option, here also a user can Display, Add, Edit & delete the records at the same time. The " Move Up " and " Move Down " buttons will move the record Up or Down the Table respectively. This is useful if you would like to keep the Records serially.

  In case you would like to EXIT program after partial Adding / Editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- Now click the " Read Me " button, the following important messages are displayed for guidance.

  1. LHS & RHS Joint #s cannot be repeated.
  2. Use Add Button to Append Record.
  3. Use Update Button to Save Your Work.
  4. LHS / RHS Joint Numbers cannot be zero.

- **Now we have come to the end of Step # 8.**
  In the next step we will Check our Data Input Graphically.

STEP NO. 8 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 9 : Data Checking Through Graphics

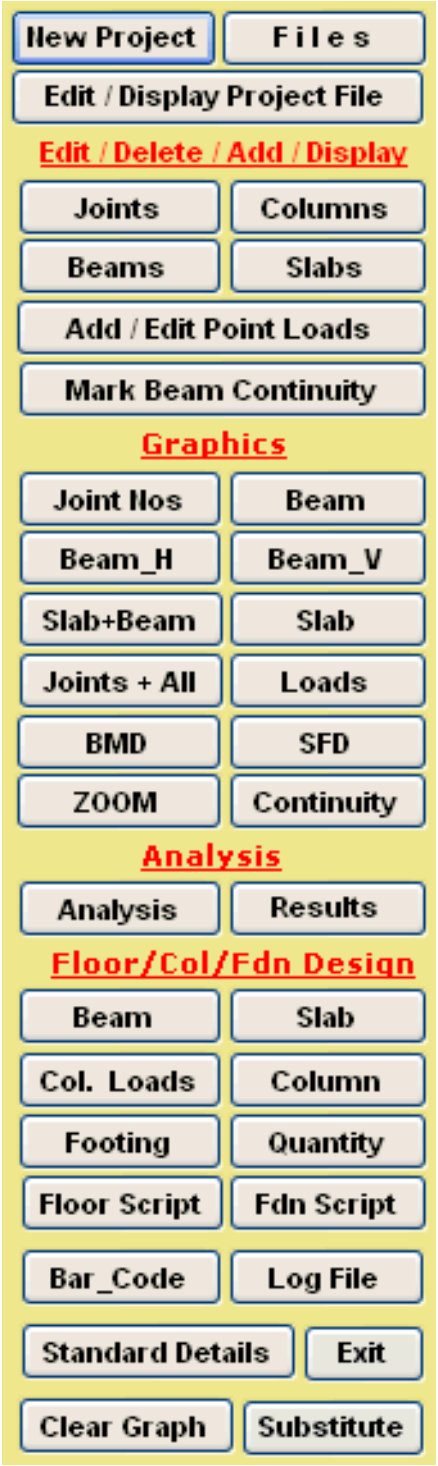
- **A User should thoroughly check Data Input at all stages. During Adding / Editing Data through tables, Beam " SPAN " and Slab Dimensions (Shorter & Longer) should be constantly monitored for any error.**
  After DATA Input is over, it should be checked visually & by taking printouts of various Graphics Options. Analysis, Design, Column Loads and Quantities options shall be run (in strict order) after Data Checking is over. If there is any error in DATA, un-expected results will be obtained after running Analysis, Design, Column Loads and Quantities options. Sometimes results obtained are such that it will be difficult to even find out that actually they are wrong due to erroneous data. Any Analysis & Design is as good as its data input. Hence the importance of Data Input cannot be over emphasized.

  Note that BMD is drawn on Tension Side which reflects Deflected shape of Beam. BMD, SFD and Load Diagrams are Important from the point of Checking Un-expected Analysis Results & Data Input.
  Any un-expected Diagram will reflect Data Error in the form of :

  • Incorrect Geometry (Span, Grid Dimension).
  • Incorrect Loads (Point Load, End Moments).
  • Floor Analysis, Beam & Slab Design not performed after Editing / Adding Geometry or Loads.

  Under " Column Load " Option Statistical Check is displayed.
  Note that the Difference in Loads is due to Maximum Loading On Column, Accounting for Beam Continuity, i.e. Maximum of Simple Reaction & Continuous Reaction is taken for Column Design.
  The Difference should not exceed say 10 %. The major difference should calls for closer look at the Data-Input.

  The Most effective check will be when AutoCAD drawing of floor plan is created using script option.
  The script command will be used after Successful Completion of Analysis, Design & Quantity options. In AutoCAD drawing, even the minor error in layout could be identified. We will discuss this in later chapters.

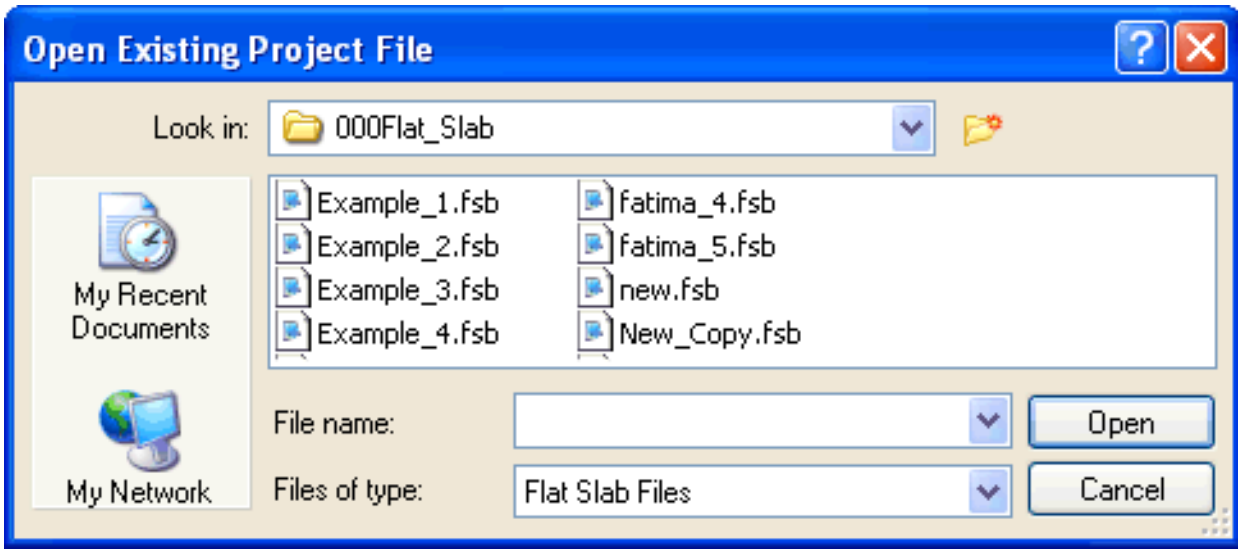

New Project
Files
Edit / Display Project File
Edit / Delete / Add / Display
Joints
Columns
Beams
Slabs
Add / Edit Point Loads
Mark Beam Continuity
Graphics
Joint Nos
Beam
Beam_H
Beam_V
Slab+Beam
Slab
Joints + All
Loads
BMD
SFD
ZOOM
Continuity
Analysis
Analysis
Results
Floor/Col/Fdn Design
Beam
Slab
Col. Loads
Column
Footing
Quantity
Floor Script
Fdn Script
Bar_Code
Log File
Standard Details
Exit
Clear Graph
Substitute

- **When Program starts, the Menu above is displayed. Under the Graphics Heading following options are displayed.**

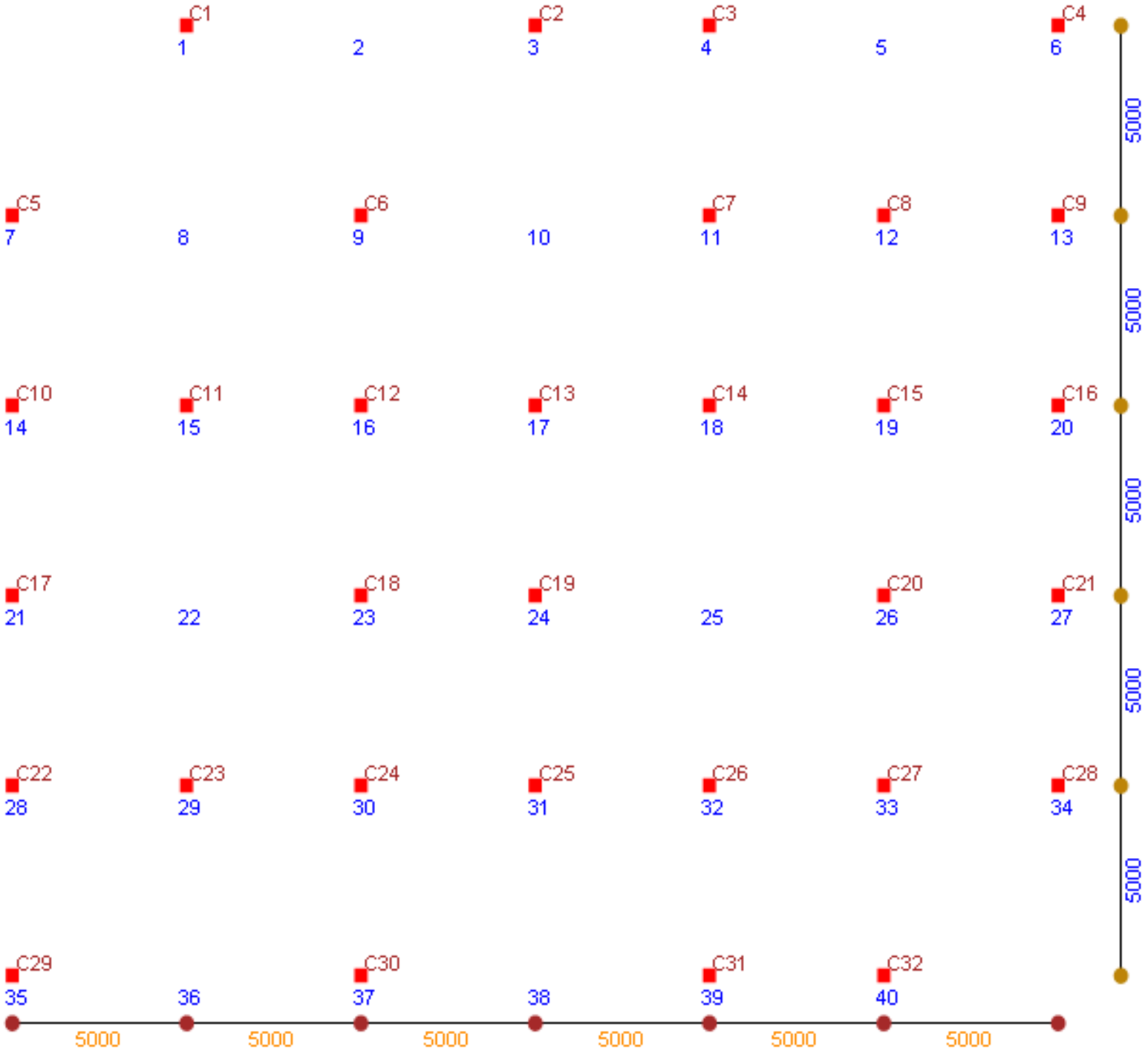
• Joint Nos
• Beam
• Beam_H (Only Horizontal Beam numbers will be Displayed).
• Beam_V (Only Vertical Beam numbers will be Displayed).
• Slab + Beam (Beams, Slabs & Columns are displayed).
• Slab (Only Slabs & Columns are displayed).
• Joints + ALL (For Display of Joints, Columns, Beams & Slabs)
• Loads (Display of Slab, Point Loads & Reactions from Secondary Beams, to be used after Analysis, and Design options have been successfully Run).
• BMD (Display of Bending Moment Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.
• SFD (Display of shear Force Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.
• Zoom (Display of part of Floor Plan under Selection).
• Continuity (Display of Beams Marked as Continuous.)

Now Click on " Joint Nos " option.

Following Graphics is displayed.

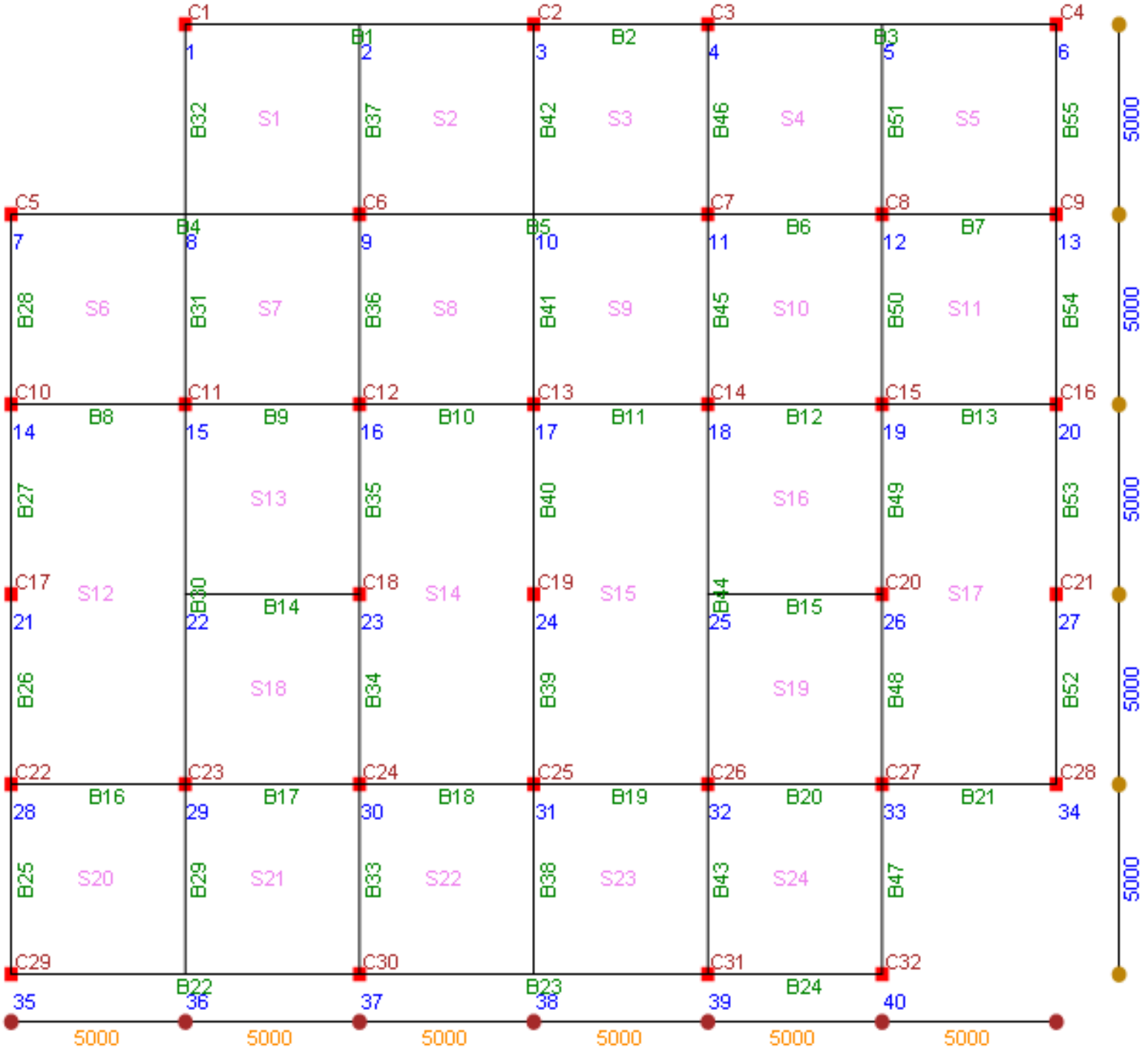


- **Now select " Example _1 File & Press Open Button.**
Following Graphics will be displayed.

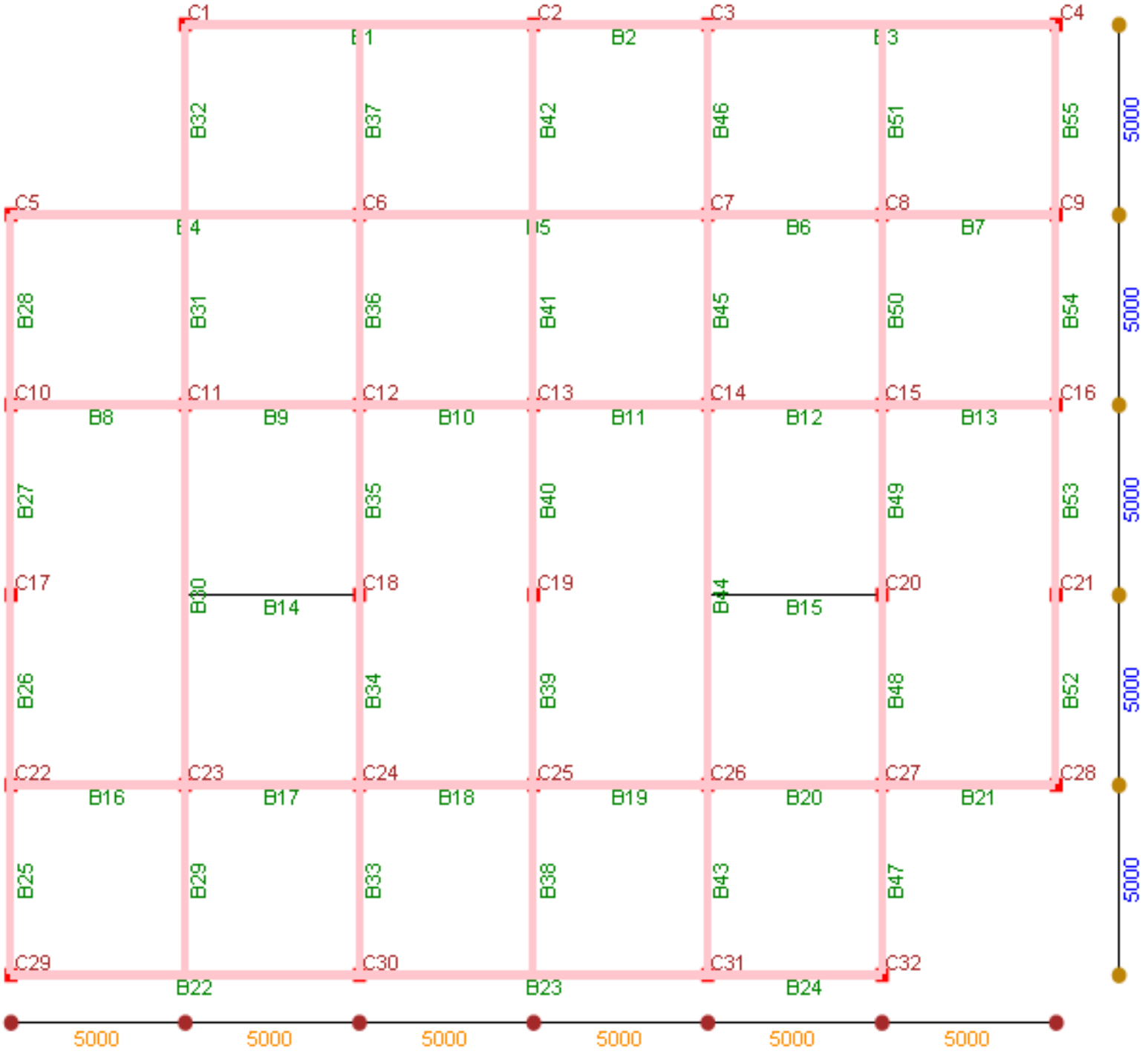


- **The above Graphics displays Joint, Column Numbers as well as Horizontal and Vertical Dimensions.**
  A User should Check the Location of Each Joint & Column & C/C Horizontal & Vertical Grid distance.

- **Now click the " Joints + ALL " button.**
  This is the all important Graphics Display, showing Joints numbers, Columns, Beam numbers and Slab numbers. If this display is not very Clear or Congested than use other options such as Beam, Beam_H (Only Horizontal Beam # will be Displayed), Beam_V (Only Vertical Beam # will be Displayed), Slab + Beam (Beams, Slabs & Columns are displayed), Slab (Only Slabs & Columns are displayed) and Zoom Option.
  Following Graphics is displayed when " Joints + ALL " button is clicked.



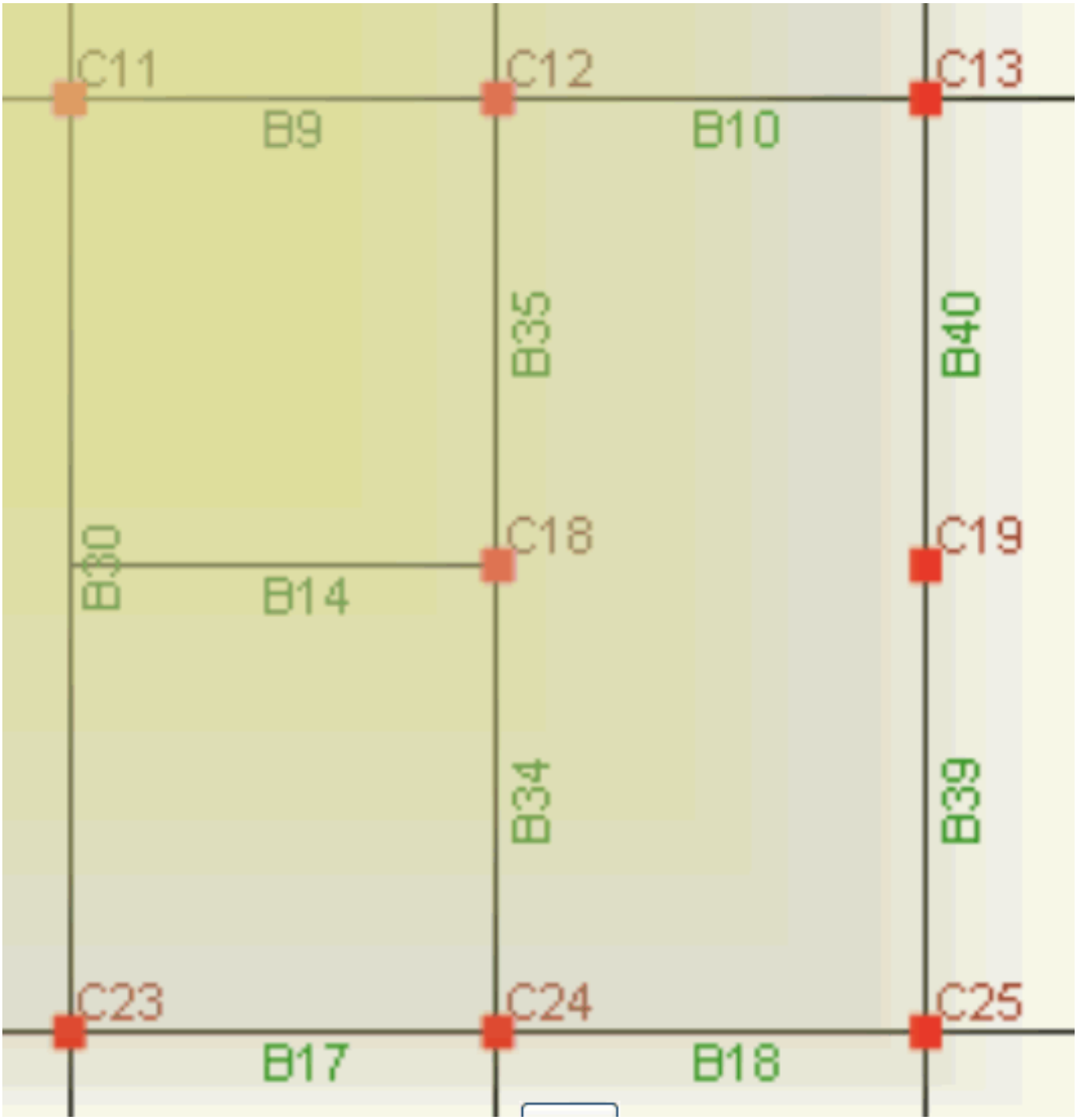
- **Now Click Continuity Button.**
  Following Graphics is displayed.



Continuity of Beams Marked in Pink

Print

- **The Beams not marked in Pink are Simply Supported Beams.**
  Now Click " Beam " button & after display of Graphics click " ZOOM " button.
  Now Left Click with mouse near the Column C11 & Drag it near the Column C25.
  You will see change in color in window as mouse is dragged. Now Lift your finger. Following ZOOM Window is displayed. Use Zoom option for more clarity on Floor plan display.



- **Note that Graphics Display of :**

• Loads (Display of Slab, Point Loads & Reactions from Secondary Beams, to be used after Analysis, and Design options have been successfully Run).

• BMD (Display of Bending Moment Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.

• SFD (Display of shear Force Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.

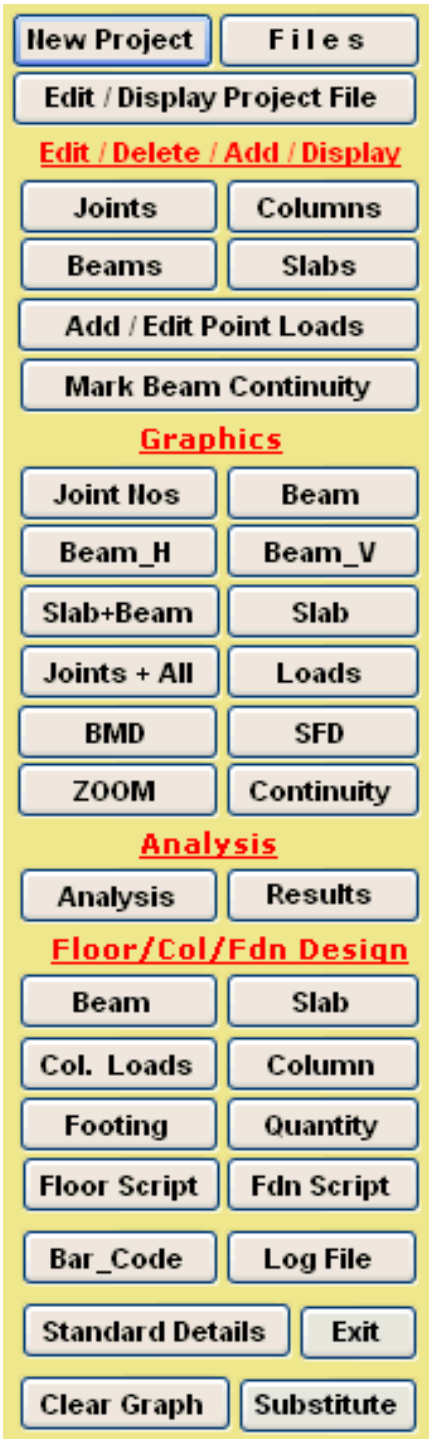
Now we have come to the end of Step # 9.

In the next step we will Run " Analysis " option.

STEP NO. 9 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 10 : Analysis & Its Results



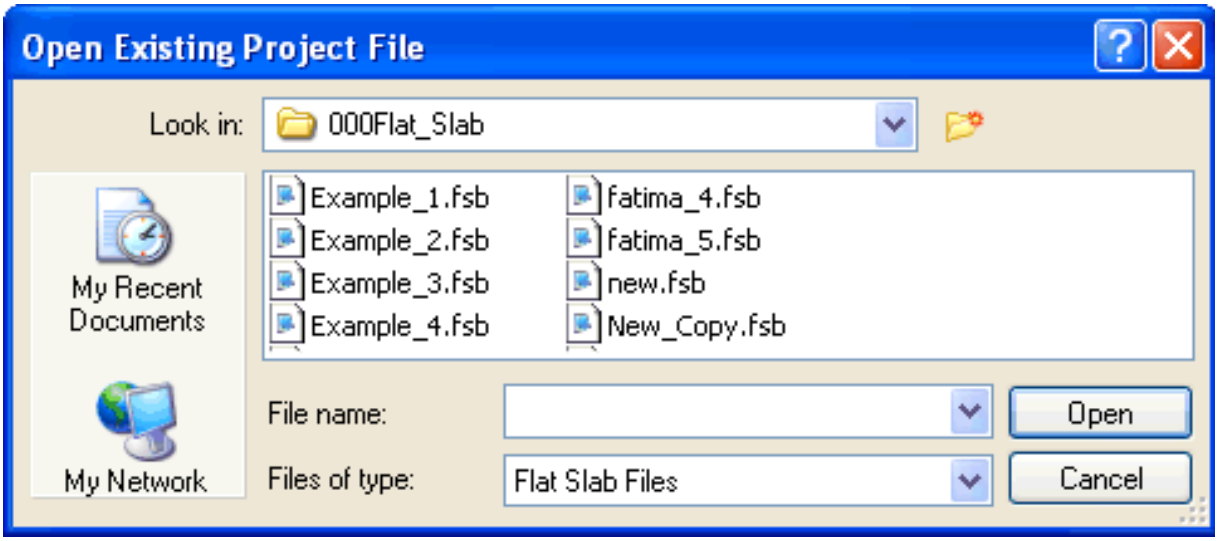
- **After entering Data & Checking it thoroughly, Relax, let the software do its Job. The 1st milestone is Analysis.**

  When Program starts, the Menu above is displayed. Under the Analysis Heading following options are displayed.

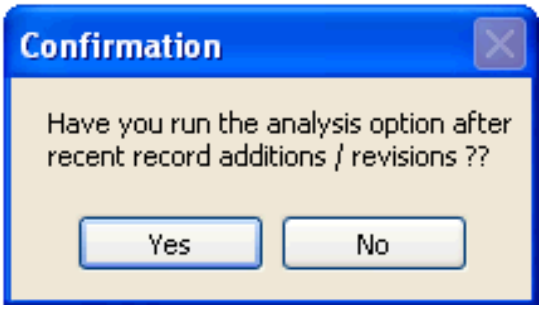
  - **Analysis**
  - **Results**

  Now Click on " Analysis " option.

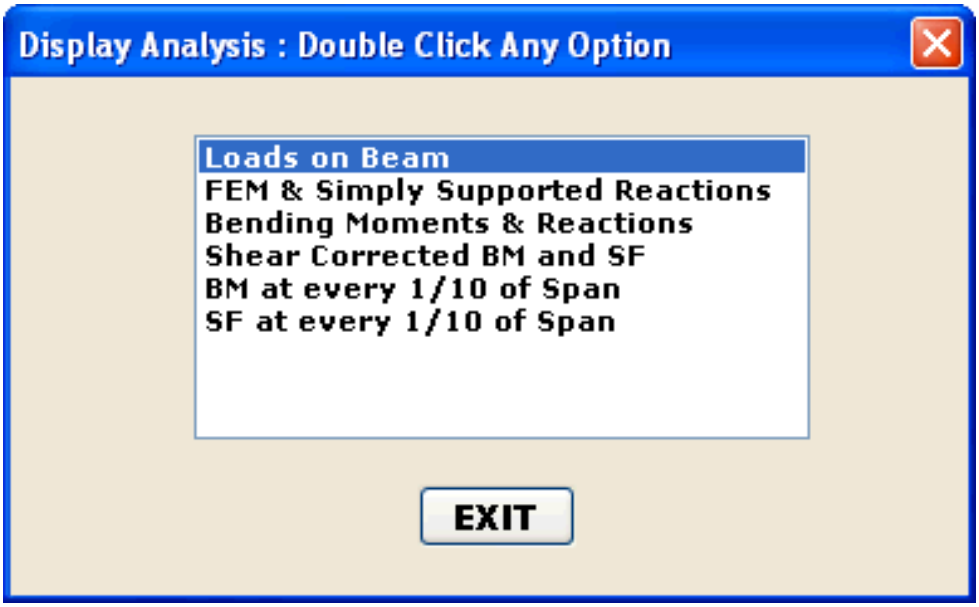
  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  The Analysis will commence. A window will open & it will indicate number of Joints, Columns, Beams Slabs to be analyzed. The Analysis will take time & will depend up on the file size & computers RAM memory. Minimum Computer RAM memory of 1 GB is recommended for faster analysis results.
  After the analysis is over a new message will appear indicating that " Analysis is Successfully Completed ".
- **Now Click the analysis " Results " option. Following Warning is displayed after Selecting File from "Open Existing Project File" window.**



- **This is a very Important Message. In case a user has edited or added any Joint / Column / Beam or Slab Member after performing analysis then he should re-perform the analysis, else old (in-correct) results will be displayed.**
  Click " Yes " if you have not revised any member after analysis or click " No " if you are not sure.
  If " Yes " is clicked then following graphics will be displayed.



- **Now Double Click on " Loads on Beam " Option. A new window will open displaying various Loads on Beams. Click on " Read Me " button, following important messages are displayed.**

  1. UDL is in T / M.
  2. Point Load is in Ton.
  3. Point Load Could be Externally Applied OR From Reaction of Secondary beam.
  4. Dist : is distance of Point Load from Left.
  5. NEAR_INT : is Slab Load in T/M Near to LHS of Beam.
  6. NEAR_DIST : is Slab Load Distance in M Near to LHS.
  7. FAR_INT : is Slab Load in T/M Far from LHS.
  8. FAR_DIST : is Slab Load Distance in M Far from LHS.
  9. Loads Calculated are not Tributary.
  10. All Loads are Non-Factored.

- **Now Double Click on " FEM & SS Reactions " Option. A new window will open displaying Fixed End Moments and Simply Supported Reaction on each Beam. Click on " Read Me " button, following important messages are displayed.**

  1. Beam Span in M.
  2. LHS SS Reaction : LHS Simply Supported Reaction in Ton.
  3. RHS SS Reaction : RHS Simply Supported Reaction in Ton.
  4. LFEM : Fixed End Moment at LHS Support in T-M.
  5. RFEM : Fixed End Moment at RHS Support in T-M.
  6. In order to Sort the Values in Ascending OR
  7. Descending Order, Just Click Column Header at Top.

- **Now Double Click on " Bending Moments and Reactions " Option. This is the most Important Option. A new window will open displaying End Moments and Reactions on each Beam. Click on " Read Me " button, following important messages are displayed.**

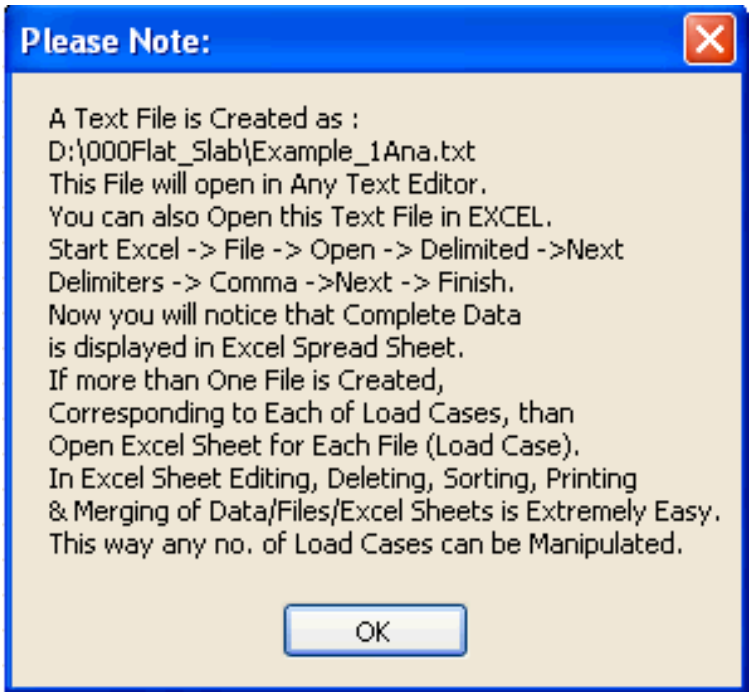
  1. -Ve BM at LHS Support in T-M.
  2. -VE BM at RHS Support in T-M.
  3. LHS Reaction in Tons.
  4. RHS Reaction in Ton.
  5. + VE Bending Moment in T-M.
  6. Distance of + VE BM from LHS Support in M.
  7. In order to Sort the Values in Ascending OR
  8. Descending Order, Just Click Column Header at Top.

  Shown below is a part Display of Support BM, SF, + Ve BM & Its Distance from Left.

DISPLAYING BENDING MOMENTS AND REACTIONS

Beam #	-VE BM LHS	- VE BM RHS	LHS Reaction	RHS Reaction	+VE BM	Distance
1	0	57.581	26.801	38.318	77.13	5
2	-57.582	57.585	11.369	11.37	-43.379	2.5
3	-57.586	0	38.318	26.801	77.129	5
4	0	144.268	28.31	65.413	84.674	5
5	-144.269	64.804	69.396	53.503	104.586	5
6	-64.805	8.332	30.914	8.325	-3.95	4
7	-8.333	0	21.286	17.953	20.495	2.8
8	0	25.518	22.766	32.973	23.222	2.1
9	-25.519	16.683	21.386	17.853	3.589	2.8
10	-16.684	26.503	25.906	29.833	13.378	2.4
11	-26.504	16.683	29.833	25.906	13.403	2.7
12	-16.684	25.518	17.853	21.386	3.614	2.3
13	-25.519	0	32.973	22.766	23.225	3
14	0	0	19.62	19.62	24.518	2.5
15	0	0	19.62	19.62	24.518	2.5
16	0	25.491	22.771	32.968	23.233	2.1
17	-25.492	16.789	21.36	17.879	3.544	2.8
18	-16.79	26.106	26.006	29.733	13.512	2.4
19	-26.107	18.164	29.458	26.281	12.787	2.7
20	-18.165	19.992	19.254	19.985	5.438	2.5
21	-19.993	0	23.618	15.621	15.503	3.1
22	0	83.854	24.174	40.945	63.995	5
23	-83.855	39.227	37.022	28.097	44.379	5

- **Note that Column Headers are all the Titles at Top as Marked in White Color. Just Click them to Sort.**
  The " Remove " Button is placed here for ease of Printing.
  For Printing Just Click " Print " Button.
  When " OK " button is clicked, following Important Message is displayed.



- **The above message describes how any number of Load Cases can be Run & Manipulated once File is Exported to Excel Spread Sheet. Note the File Name Carefully.**
  Similar File is created for " Shear Corrected BM & SF " option.

  Now Double Click on " Shear Corrected BM & SF " Option. These values are used for beam Design. A new window will open displaying Shear Corrected Moments and Shear Forces on each Beam for all the three (3) cases. Click on " Read Me " button, following important messages are displayed.

  1. Beam Width, Depth in MM.
  2. Shear Corrected BM & SF are calculated at Support Face
  3. and At Effective Depth from Support Face Respectively.
  4. LHS / RHS Shear Corrected BM in T-M.
  5. LHS Shear Corrected Shear in Tons.
  6. RHS Shear Corrected Shear in Tons.
  7. In order to Sort the Values in Ascending OR
  8. Descending Order, Just Click Column Header at Top.

- **Now Double Click on " BM at Every 1 / 10 th of Span " Option. A new window will open displaying Distance from Left and its BM on each Beam. Click on " Read Me " button, following important messages are displayed.**

  1. bm0 = Bending Moment at LHS Support.
  2. d0 = Distance zero from LHS Support.
  3. bm1 = Bending Moment at a distance d1
  4. M. from LHS Support, and so on.
  5. Distances are Multiple of 1 / 10 th of Span.
  6. Bending Moments are in T-M.
  7. In order to Sort the Values in Ascending OR
  8. Descending Order, Just Click Column Header at Top.

- **Now Double Click on " SF at Every 1 / 10 th of Span " Option. A new window will open displaying Distance from Left and its SF on each Beam. Click on " Read Me " button, following important messages are displayed.**

  1. sf0 = Shear Force at LHS Support.
  2. d0 = Distance zero from LHS Support.
  3. sf1 = Shear Force at a distance d1
  4. M. from LHS Support, and so on.
  5. Distances are Multiple of 1 / 10 th of Span.
  6. Shear Forces are in T.
  7. In order to Sort the Values in Ascending OR
  8. Descending Order, Just Click Column Header at Top.

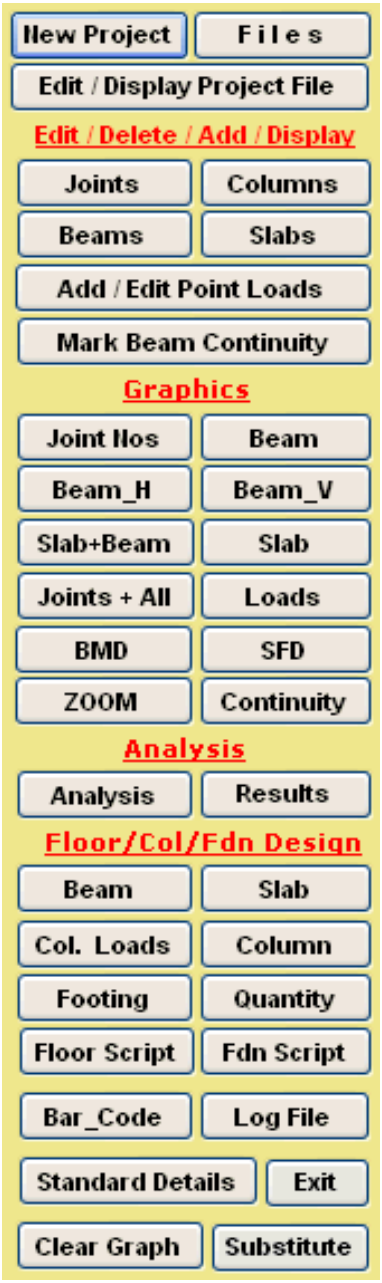
- **Now we have come to the end of Step # 10.**
  In the next step we will Run " Hidden Beam Design " Option.

STEP NO. 10 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 11

Hidden Beam & Slab Design, Column Loads, Quantities & Cost Estimation

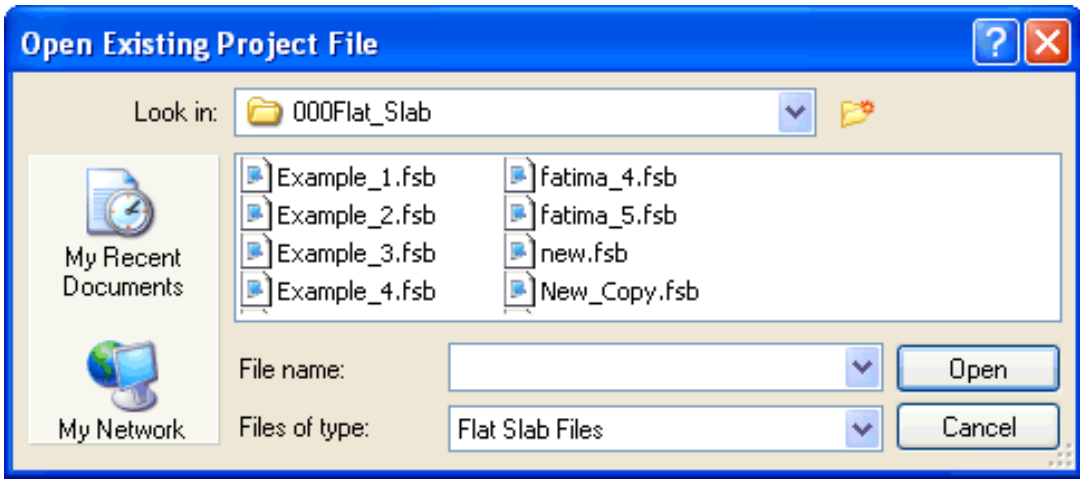


- **When Program starts, the Menu above is displayed. Under the Floor/Col/Fdn Design Heading following options are displayed.**

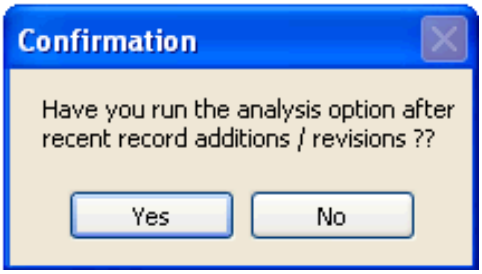
  - **Beam**
  - **Slab**
  - **Column Loads**
  - **Column Design**
  - **Footing Design**
  - **Quantity**
  - **Floor Script for AutoCAD Dwg.**
  - **Foundation Script for AutoCAD Dwg.**

  Now Click on " Beam " Option.

  Following Graphics is displayed.



- **Now select " Example _1 File & Press Open Button.**
  Following Warning is displayed.



- **This is a very Important Message. In case a user has edited or added any Joint / Column / Beam or Slab Member after performing analysis then he should re-perform the analysis, else old (in-correct) results will be displayed.**
  Click " Yes " if you have not revised any member after analysis or click " No " if you are not sure.
  If " Yes " is clicked then following Beam Schedule will be displayed.

HIDDEN BEAM REINFORCEMENT SCHEDULE

Beam			Bottom Steel			Extra LHS Support Steel			Extra RHS Support Steel			
No.	Width	Depth	Straight	Curtail	Top Steel	#	Top	Bottom	#	Top	Bottom	Stirrups
1	1250	360	27 T 16	26 T 16	28 T 12	C1	25 T 16	9 T 12	C2	38 T 16	9 T 12	T 8 @ 235 5 Legged
2	1250	360	14 T 16	14 T 16	28 T 16	C2			C3	38 T 16	9 T 12	T 8 @ 210 7 Legged
3	1250	360	27 T 16	26 T 16	28 T 12	C3			C4	25 T 16	9 T 12	T 8 @ 210 7 Legged
4	2500	360	27 T 16	27 T 16	17 T 12	C5	44 T 20	17 T 12	C6	57 T 20	24 T 12	T 6 @ 600 10 Legged
5	2500	360	23 T 20	22 T 20	17 T 12	C6			C7	40 T 16	17 T 12	T 12 @ 135 10 Legged
6	1250	360	5 T 12	4 T 12	13 T 12	C7			C8	9 T 12	9 T 12	T 10 @ 165 10 Legged
7	1250	360	11 T 12	11 T 12	9 T 12	C8			C9	9 T 12	9 T 12	T 8 @ 370 10 Legged
8	1250	360	13 T 12	12 T 12	9 T 12	C10	16 T 12	9 T 12	C11	23 T 12	9 T 12	T 6 @ 600 10 Legged
9	1250	360	5 T 12	4 T 12	9 T 12	C11			C12	14 T 12	9 T 12	T 10 @ 160 10 Legged
10	1250	360	7 T 12	7 T 12	9 T 12	C12			C13	22 T 12	9 T 12	T 6 @ 350 10 Legged
11	1250	360	7 T 12	7 T 12	9 T 12	C13			C14	14 T 12	9 T 12	T 8 @ 520 10 Legged
12	1250	360	5 T 12	4 T 12	9 T 12	C14			C15	23 T 12	9 T 12	T 10 @ 180 10 Legged
13	1250	360	13 T 12	12 T 12	9 T 12	C15			C16	15 T 12	9 T 12	T 8 @ 395 10 Legged
14	1250	360	14 T 12	13 T 12	9 T 12	B30			C18	9 T 12	9 T 12	T 6 @ 600 10 Legged
15	1250	360	14 T 12	13 T 12	9 T 12	B44			C20	9 T 12	9 T 12	T 6 @ 600 10 Legged
16	1250	360	13 T 12	12 T 12	9 T 12	C22	15 T 12	9 T 12	C23	23 T 12	9 T 12	T 6 @ 600 10 Legged
17	1250	360	5 T 12	4 T 12	9 T 12	C23			C24	14 T 12	9 T 12	T 10 @ 155 10 Legged
18	1250	360	7 T 12	7 T 12	9 T 12	C24			C25	21 T 12	9 T 12	T 8 @ 410 10 Legged
19	1250	360	7 T 12	7 T 12	9 T 12	C25			C26	15 T 12	9 T 12	T 8 @ 385 10 Legged
20	1250	360	5 T 12	4 T 12	9 T 12	C26			C27	17 T 12	9 T 12	T 10 @ 170 10 Legged

- **Note that in the Hidden Beam Schedule if " Error : See Log File " is displayed for any Beam then designer shall click the Log File button in the Main Menu, which will display the Cause of Un-Safe design. Designer shall take the steps to correct the design by either of the following measures.**
  - **Reframe General Arrangement (GA) Plan.**
  - **Revise Hidden Beam / Flat Slab Depth.**
  - **Increase Column Size.**
  - **Increase Concrete Grade.**

- **After every rectification measure Re-Run the Analysis File. After analysis is over, again perform Beam Design, till you will find that there is no error in Beam Schedule.**

Click READ ME button, following important points are displayed.

1. Width / Depth in MM.

2. T Indicates Tor Steel.

3. d Indicates Mild Steel.

4. Spacing of Links in MM C/C.

5. RHS Means Right Hand Side.

6. Always Run Analysis Option before Beam Design.

7. ERROR : Indicates Design Parameter Error, Refer LOG File for Details.

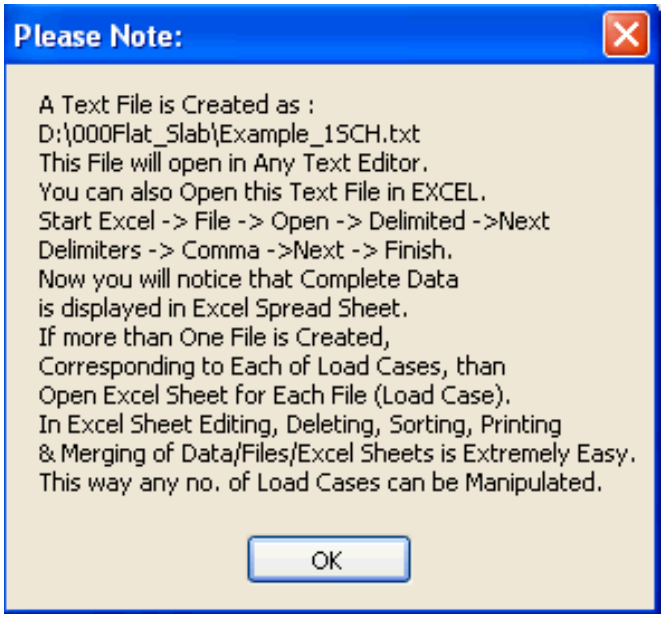
8. Clear Cover is taken from Project File.

9. If Steel is provided in 2 or More Layers, then Effective cover shall be revised by the User.

10. Refer Standard Details for Reinforcement Placement.

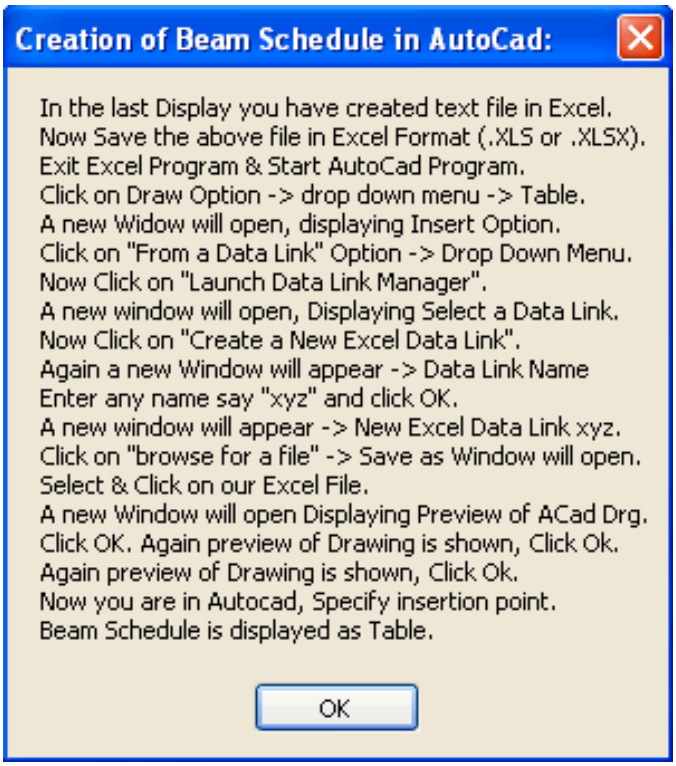
11. For Substitution of Reinforcements / Links refer Substitute Program.

When " OK " button is clicked, following Important Message is displayed.



- **The above message describes how any number of Load Cases can be Run & Manipulated once File is Exported to Excel Spread Sheet. Note the File Name Carefully.**

When " OK " button is clicked, following Message Regarding Creation of Beam Schedule in AutoCAD is displayed.



- **For Detail explanation refer step no. 14.**
  Now Click " Slab " Option. Following Graphics is displayed.

SLAB REINFORCEMENT SCHEDULE

Slab		Steel Along Shorter Direction			Steel Along Longer Direction		
No.	Thickness	Btm Straight	Bottom Cut	@ Support Top	Btm straight	Bottom Cut	@ Support Top
S1	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S2	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S3	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S4	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S5	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S6	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S7	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S8	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S9	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S10	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S11	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S12	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S13	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S14	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S15	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S16	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S17	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S18	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S19	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S20	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S21	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S22	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150

- **Note that in the Flat Slab Schedule if " Error : See Log File " is displayed for any Slab then designer shall click the Log File button in the Main Menu, which will display the Cause of Un-Safe design. Designer shall take the steps to correct the design by either of the following measures.**

  - **Reframe General Arrangement (GA) Plan.**
  - **Revise Hidden Beam / Flat Slab Depth.**
  - **Increase Column Size.**
  - **Increase Concrete Grade.**

Click READ ME button, following important points are displayed.

1. Flat Slab Thickness in MM.

2. T Indicates Tor Steel.

3. d Indicates Mild Steel.

4. @ means Spacing of Bars in MM C/C.

5. Cut means curtailed bars near mid span bottom .

6. Straight means bottom bars extending to supports.

7. Longer Span reinforcements shall be placed at bottom.

8. Shorter reinforcements shall be placed above Longer steel.

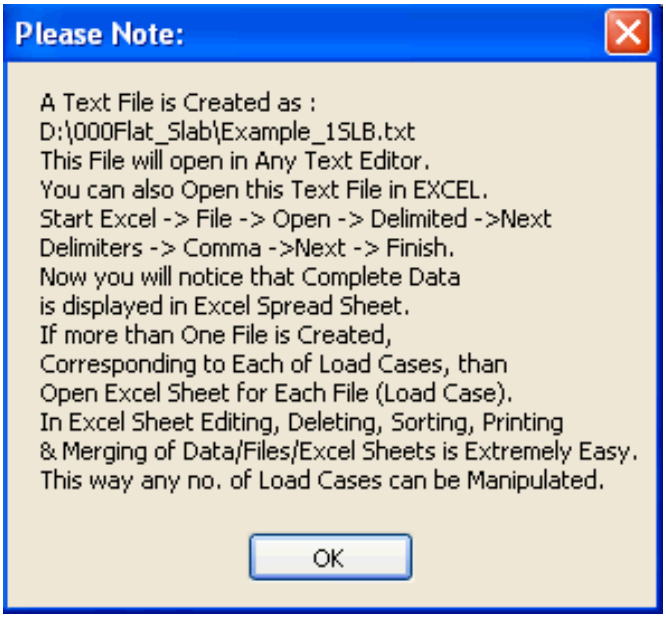
9. ERROR : Indicates Design Parameter Error, Refer LOG File for Details.

10. Clear Cover is taken as 20 mm.

11. Always Run Analysis & Beam Design Option before running Slab Design to avoid ERRORS.

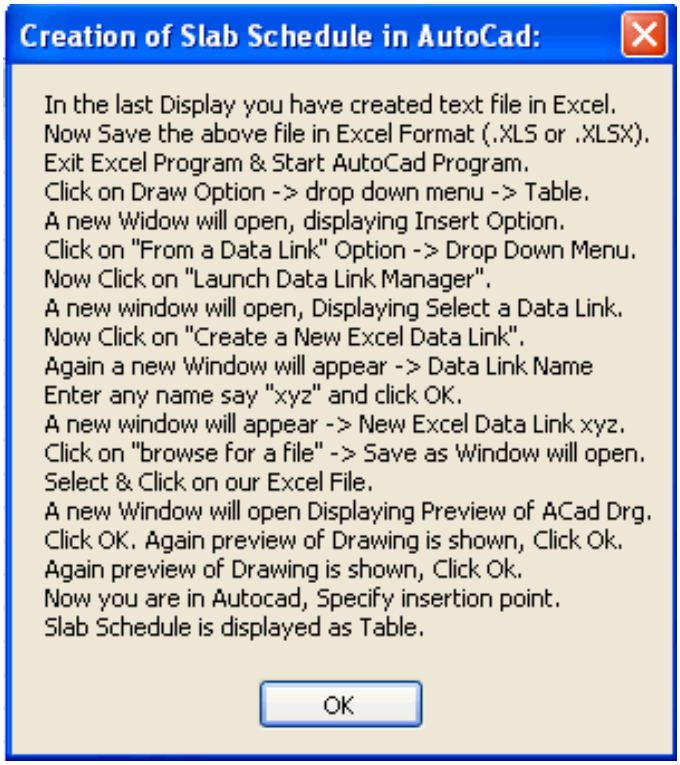
12. Refer Standard Details for Reinforcement Placement, which is same as that of Hidden beams.

13. For Substitution of Steel / Links refer Substitute Program.



- **The above message describes how any number of Load Cases can be Run & Manipulated once the File is Exported to Excel Spread Sheet. Note the File Name Carefully.**

When " OK " button is clicked, following Message Regarding Creation of Slab Schedule in AutoCAD is displayed.

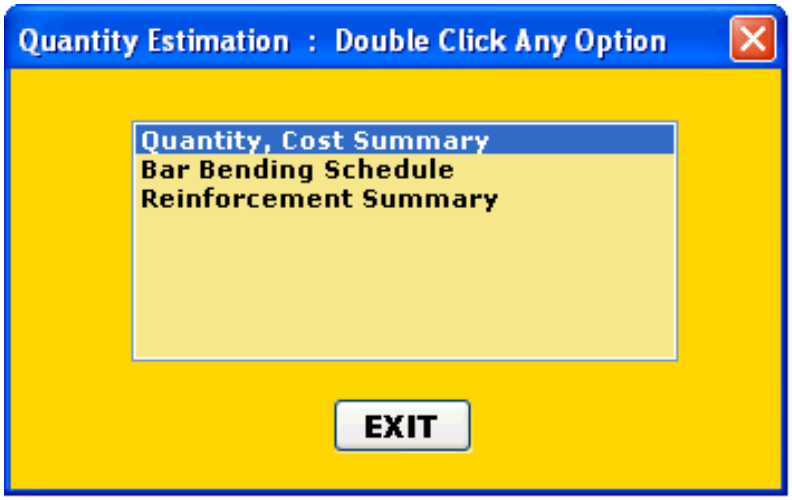


- **For Detail explanation refer step no. 15.**

Now Click " Quantity " Option.
A window will open displaying four options viz;

- **Floor Beams + Slabs**
- **Column Project**
- **Footing Project**
- **Total Project**

Click on Floor Beams + Slabs Option, following Graphics is displayed.



- **Now Double Click " Quantity, Cost Summary " Option. Following Graphics is displayed.**

DISPLAYING FLOOR QUANTITIES AND COST SUMMARY

Item	Quantity	Rate	Cost
M35 Concrete in M3	252	6000	1512000
Total Reinforcement in Tons	28.271	50000	1413550
Total Masonry Work in M2	653.449	850	555431.6
Total Plaster in M2	2006.898	400	802759.2
Total Painting in M2	2006.898	100	200689.8
Total Floor Area in M2 (Flooring)	700	800	560000
Total Door / Windows in M2	92.4	2500	231000
Total Cost of Floor			5275431
Unit Cost of Floor in Rs / M2			7536.329
Unit Cost of Floor in Rs / sqft			701.053
Total Cement Bags Required in Nos.	3735		
Total Sand Consumption in M3	196		
Total Aggregate Required in M3	223		

- **The above display gives cost summary as per the Rates Put-In during creation of Project File. Now Double Click " Bar Bending Schedule " Option. Following Graphics is displayed.**

HIDDEN BEAM BAR BENDING SCHEDULE

Beam #	Description	Code	Nos	Dia	Dim_A	Dim_B	Length	Quantity
1	B1-btm steel->st	3	27	16	10.55		10.646	453.45
1	B1-btm steel->cut	1	26	16	7		7	287.111
1	B1-top steel	1	28	12	4.3		4.3	106.838
1	B1-stirrups	8	42	8	0.31	1.2	3.212	53.203
1	B1-lhs btm bar	5	9	12	3.175	0.075	3.214	25.667
1	B1-lhs top bar	5	25	16	3.175	0.128	3.254	128.332
1	B1-rhs btm bar	1	9	12	4.5		4.5	35.938
1	B1-rhs top bar	1	38	16	4.5		4.5	269.758
2	B2-btm steel->st	1	14	16	5.75		5.75	126.991
2	B2-btm steel->cut	1	14	16	3		3	66.256
2	B2-top steel	1	28	16	3.3		3.3	145.764
2	B2-stirrups	8	23	8	0.31	1.2	3.212	29.135
2	B2-rhs top bar	1	38	16	4.5		4.5	269.758
2	B2-rhs btm bar	1	9	12	4.5		4.5	35.938
3	B3-btm steel->st	3	27	16	10.55		10.646	453.45
3	B3-btm steel->cut	1	26	16	7		7	287.111
3	B3-top steel	1	28	12	4.3		4.3	106.838
3	B3-stirrups	8	46	8	0.31	1.2	3.212	58.271
3	B3-rhs btm bar	5	9	12	3.175	0.075	3.214	25.667
3	B3-rhs top bar	5	25	16	3.175	0.128	3.254	128.332
4	B4-btm steel->st	3	27	16	10.55		10.646	453.45
4	B4-btm steel->cut	1	27	16	7		7	298.154
4	B4-top steel	1	17	12	4.3		4.3	64.866
4	B4-stirrups	8	17	6	0.31	2.45	5.664	21.36
4	B4-lhs btm bar	5	17	12	3.175	0.075	3.214	48.483
4	B4-lhs top bar	5	44	20	3.175	0.26	3.375	366.037
4	B4-rhs btm bar	1	24	12	6		6	127.78
4	B4-rhs top bar	1	57	20	6		6	842.995
5	B5-btm steel->st	1	23	20	10.75		10.75	609.446

- **The BBS should be read in conjunction with " Bar Code " and " Std. Details ".**
  Buttons shown in Main Menu, Just Click to get Display.
  Note the unique style of creating BBS without the Bar Mark. This BBS is only for Beams.
  Now Double Click " Reinforcement Summary " Option. Following Graphics is displayed.

SUMMARY OF REINFORCEMENTS IN KG

6 MM Dia :	0
8 MM Dia :	464.901
10 MM Dia :	8324.371
12 MM Dia :	10546.07
16 MM Dia :	6656.446
20 MM Dia :	2143.846
25 MM Dia :	0
32 MM Dia :	0

TOTAL REINFORCEMENT IN TONS = 28.135

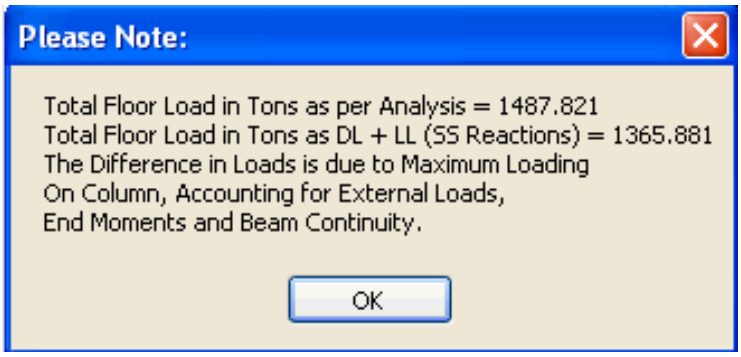
- **The MTO includes total of Hidden Beam and Slab steel Quantities. Beam steel quantities are taken from BBS and Slab quantities have been worked out approximately from Slab Schedule.**
  Now Double Click " Column Loads " Option from the Main Menu. Following Graphics is displayed.

COLUMN LOADS

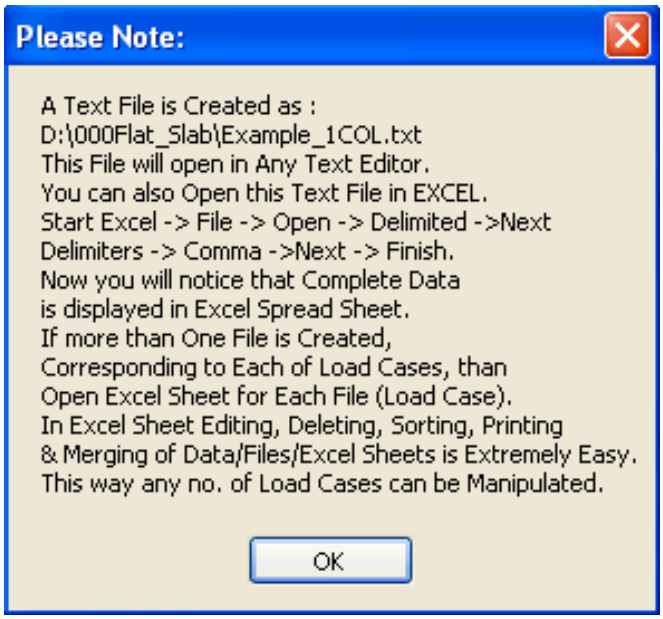
Column No.	Length in MM	Width in MM	Height in M	Load in Tons
C1	450	450	3	28.947
C2	450	450	3	43.975
C3	450	450	3	43.976
C4	450	450	3	28.947
C5	450	450	3	34.881
C6	450	450	3	107.343
C7	450	450	3	79.006
C8	450	450	3	51.934
C9	450	450	3	29.666
C10	450	450	3	30.104
C11	450	450	3	80.159
C12	450	450	3	47.685
C13	450	450	3	48.888
C14	450	450	3	75.667
C15	450	450	3	51.302
C16	450	450	3	28.065
C17	450	450	3	22.882
C18	450	450	3	42.875
C19	450	450	3	38.798
C20	450	450	3	43.654
C21	450	450	3	26.081
C22	450	450	3	30.103
C23	450	450	3	80.889
C24	450	450	3	50.895
C25	450	450	3	51.521
C26	450	450	3	77.553
C27	450	450	3	43.776
C28	450	450	3	16.694
C29	450	450	3	28.947

C28	450	450	3	16.694
C29	450	450	3	28.947

- **The above Column Loads Graphics is self explanatory. Self Weight of Column is included.**
  When " OK " button is clicked following vital Statistical Check is displayed.
  Note that the Difference in Loads is due to Maximum Loading On Column, Accounting for Beam Continuity, i.e. Maximum of Simple Reaction & Continuous Reaction is taken for Column Design.
  The Difference should not exceed say 15 %. The major difference should calls for closer look at the Data-Input.



- **When " OK " button is clicked, following Important Message is displayed.**

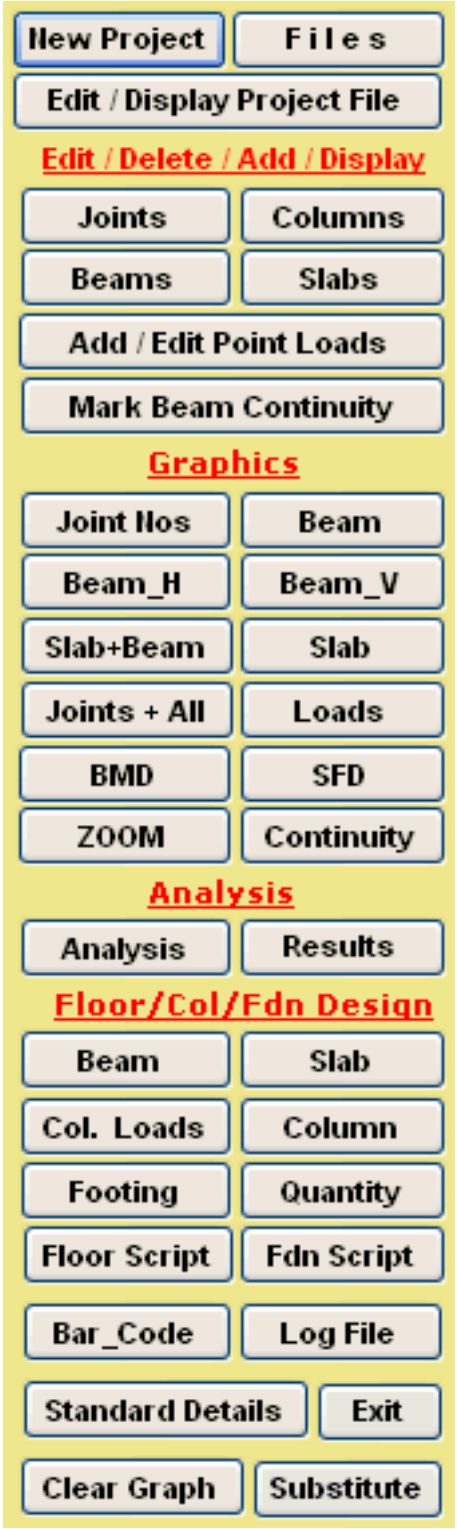


- **The above message describes how any number of Load Cases can be Run & Manipulated once the File is Exported to Excel Spread Sheet. Note the File Name Carefully.**
  Click " OK " button.
  Now we have come to the end of Step # 11.
  Let us proceed to Step No. 12.

STEP NO. 11 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 12 : BENDING MOMENT, SHEAR FORCE DIAGRAM LOAD DISPLAY AND FILES OPTION

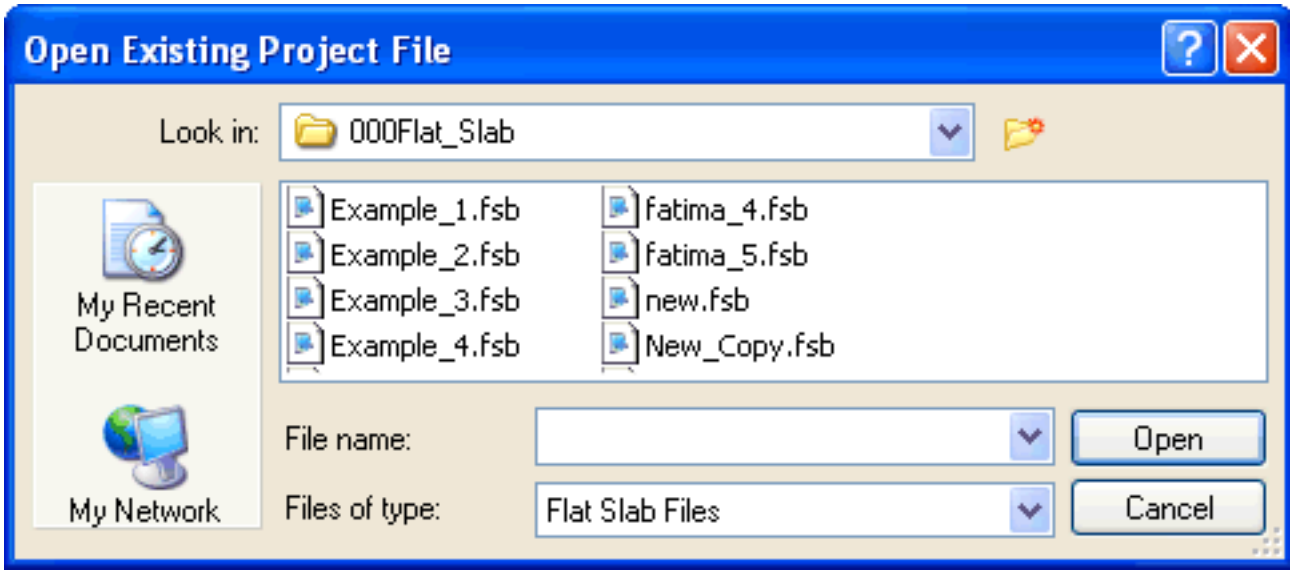


When Program starts, the Menu above is displayed. Under the Graphics Heading following options are displayed.

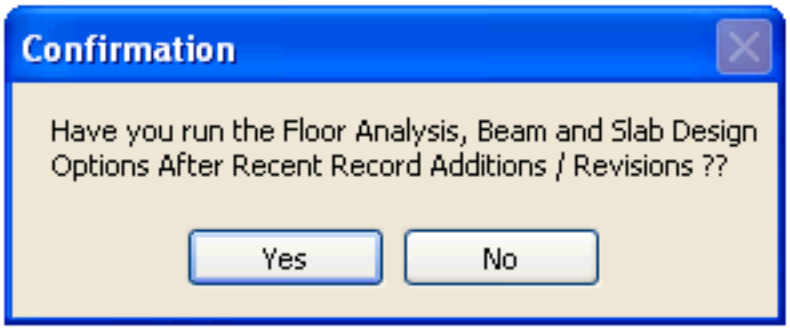
- **Joint Nos**
- **Beam**
- **Beam_H (Only Horizontal Beam # will be Displayed).**
- **Beam_V (Only Vertical Beam # will be Displayed).**
- **Slab + Beam (Beams, Slabs & Columns are displayed).**
- **Slab (Only Slabs & Columns are displayed).**
- **Joints + ALL (For Display of Joints, Columns, Beams & Slabs)**
- **Loads (Display of Slab, Point Loads & Reactions from Secondary Beams, to be used after Analysis, and Design options have been successfully Run).**
- **BMD (Display of Bending Moment Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.**
- **SFD (Display of shear Force Diagram, to be used after Analysis, Design & Quantity options have been successfully Run.**
- **Zoom (Display of part of Floor Plan under Selection).**
- **Continuity (Display of Beams Marked as Continuous.)**

Now Click on " BMD " option.

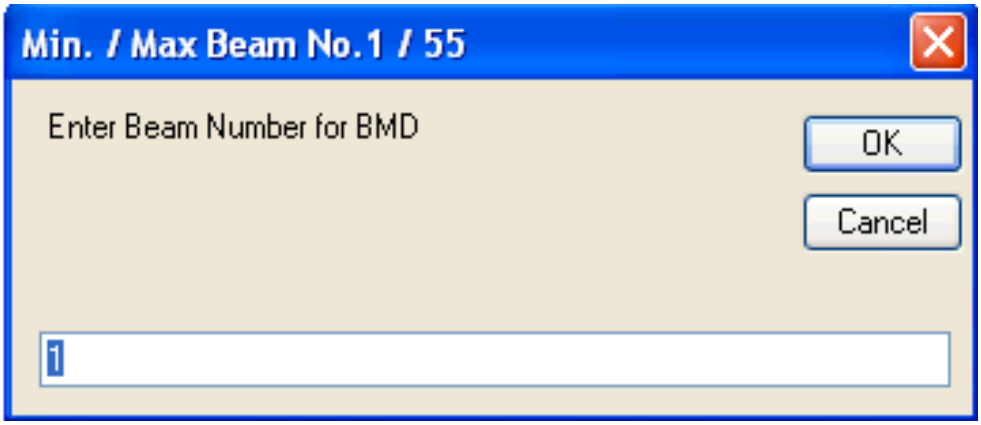
Following Graphics is displayed.



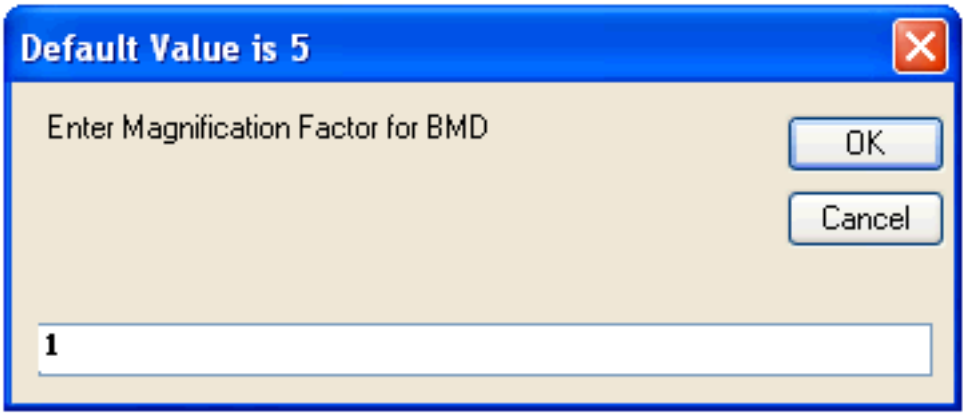
- **Now select " Example _1 File & Press Open Button. Following Warning is displayed.**



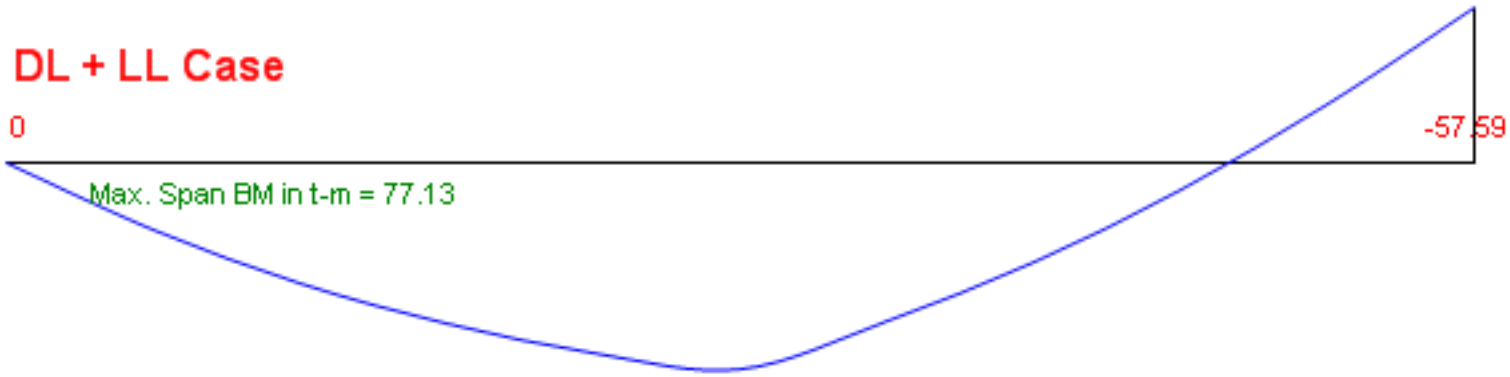
- **This is a very Important Message. In case a user has edited or added any Joint / Column / Beam or Slab Member after performing analysis then he should re-perform the analysis, else old (in-correct) results will be displayed. The Beam and Slab Designs are equally important as these options inform you about correctness of Beam & Slab Design.**
  Click " Yes " if you have not revised any member after analysis or click " No " if you are not sure.
  If " Yes " is clicked then following graphics will be displayed.



- **Type the Beam # whose BMD, you would like to see. I want to see BMD for B1. Click Ok.**
  Following message is displayed.



- **You are asked to specify Magnification Factor (MF). You have to do trial & error to achieve the required MF for appropriate display on computer screen. MF = 1.0**
  Following BMD is displayed.



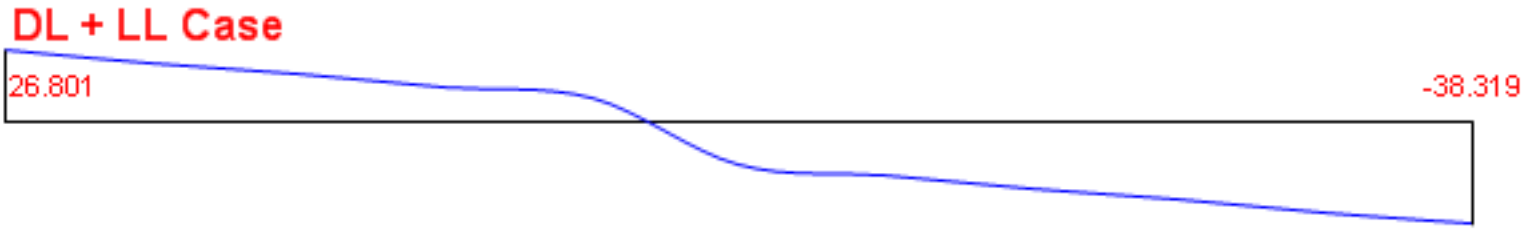
- **Note that BMD is drawn on Tension Side which reflects Deflected shape of Beam. BMD, SFD and Load Diagrams are Important from the point of Checking Results & Data Input. Any un-expected Diagram will reflect Data Error in the form of :**

  • Incorrect Geometry (Span, Grid Dimension).
  • Incorrect Loads (Point Load, End Moments).
  • Floor Analysis, Beam & Slab Design not performed after Editing / Adding Geometry or Loads.

  Since we have not given any Externally applied End Moments, all the displays are same.
  The " Next " button is very useful as it can help you to display continuously the required BMD for a specified Beam.

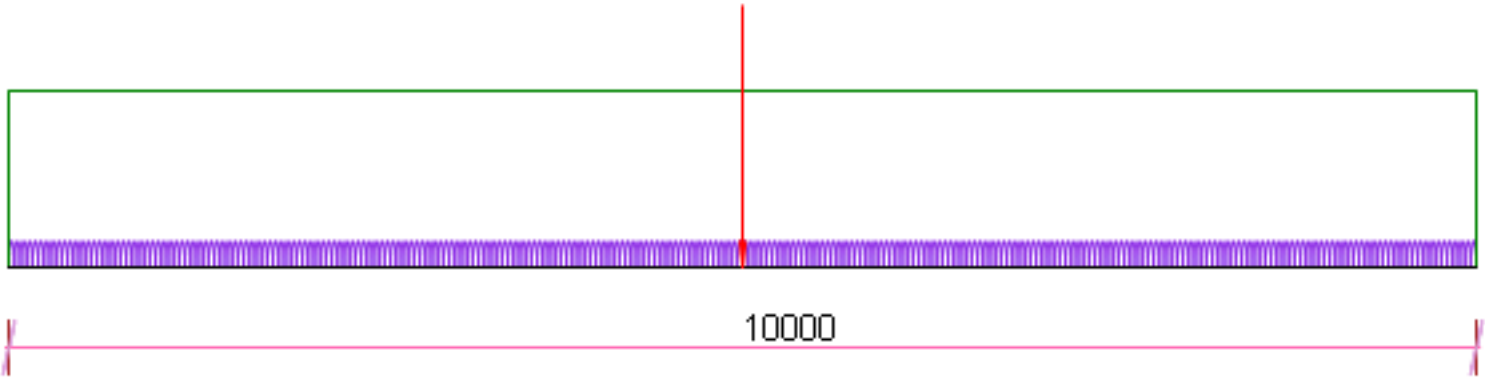
  Now Click on " SFD " option. The procedure is exactly same as that of BMD.

  SFD is displayed as under. MF = 1.0



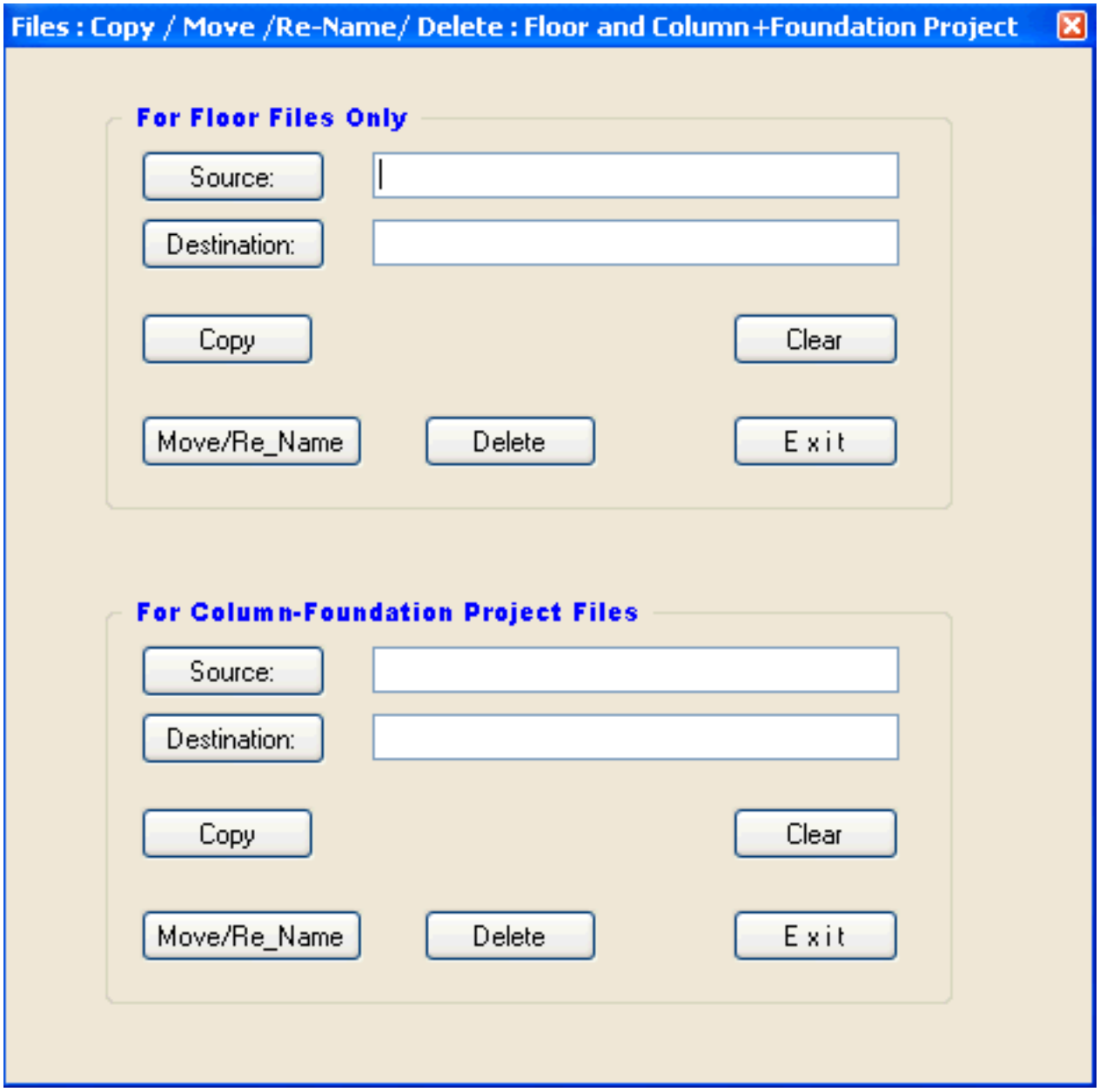
- **Now Click " Loads " button. The procedure is exactly same as that of BMD / SFD.**

  Load Diagram is displayed as under. MF = 5



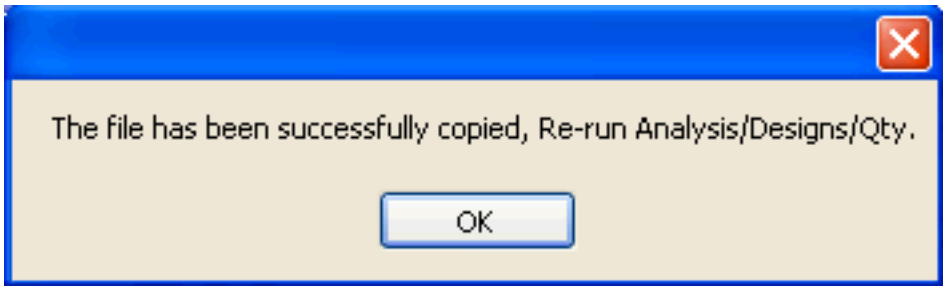
UDL in t/m = 1.25
Near Int. in t/m = 3.3 @ dist. of 0 m : Far Int. in t/m = 3.3 @ dist. of 5 m
Near Int. in t/m = 3.3 @ dist. of 5 m : Far Int. in t/m = 3.3 @ dist. of 10 m
Point Load in t = 19.62 @ dist. of 5 m

- **The best way to check data entry is Load Diagram. Check that Loads are Correct in magnitude as well as in Location & Shape. Check the presence or absence of Point Load Reaction from Secondary beams. In the present case the reaction point load is from beam B37 on B1. Check span with total of slab load distances. All distances are from LHS.**
- **Now Click " Files " button at the top.**
  Following window is displayed.



- **Here we have 2 menus, one for Floor file and another for Column-Foundation Project File.**

  Use " For Floor Files Only " option to Copy, Delete & Move / Re-Name Floor Files.
  Now we will copy Example_1 file to Example_2 file. Click " Source " Button & select Eample_1 File from the file Dialogue Box. Again Click " Destination " Button & select Eample_2 File from the file Dialogue Box. Click " Copy " button. Following Window is displayed.



- **Similarly we can use Delete Option to Delete Files, however note that there will be no " Destination " file & destination text box shall be empty.**

Note that Floor File extension is " .fsb ", while Column-Foundation File Extension is " .DAT ".

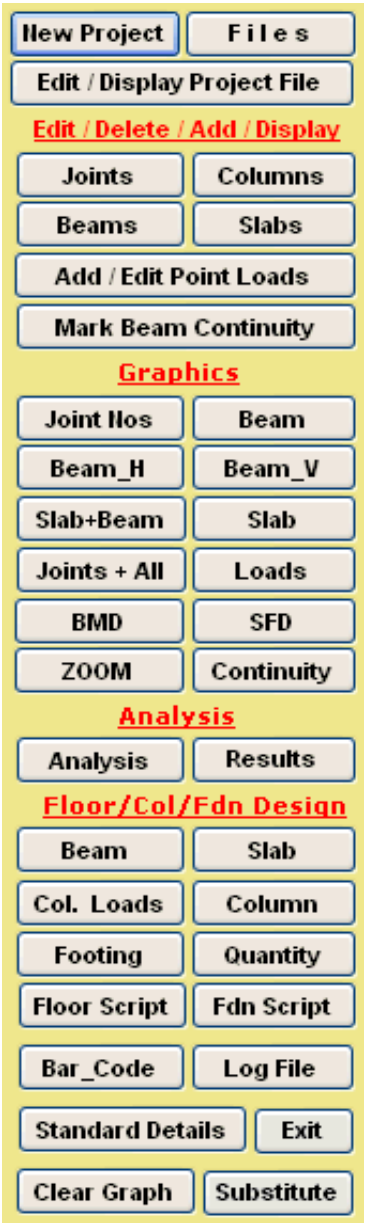
The Column-Foundation File menu is similar to Floor File Menu, only difference is File extension.
Hence Use " For Column-Foundation Project File " option to Copy, Delete & Move / Re-Name
Column and Foundation Files.

Now we have come to the end of Step # 12.

STEP NO. 12 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP 13 : CREATION OF FLOOR AND FOUNDATION PLAN IN AUTOCAD

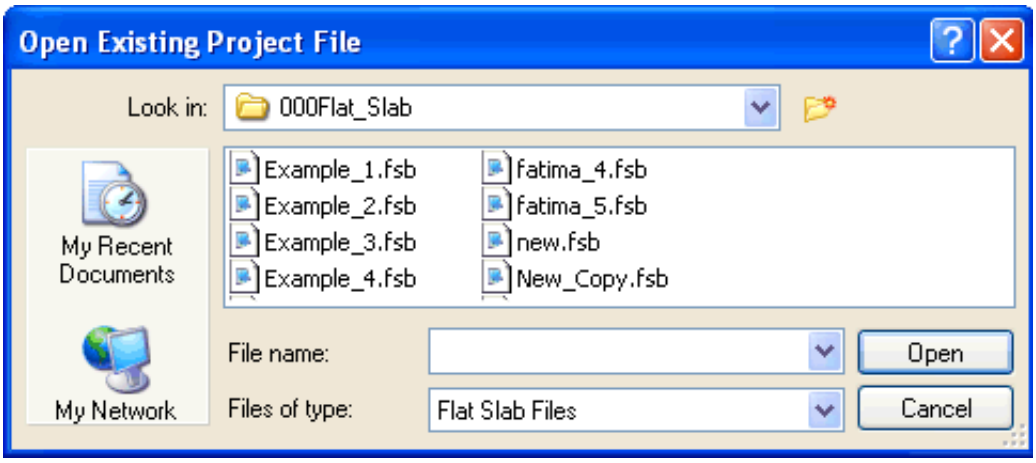


When The Program starts, the above Menu is displayed.

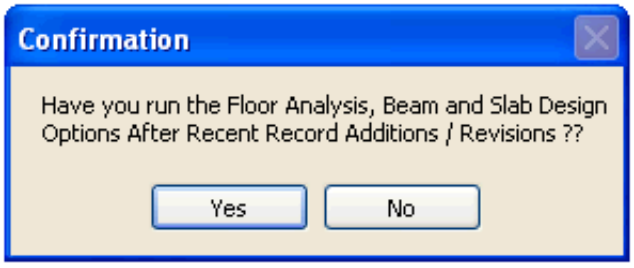
➤ Under the **Floor/Col/Fdn Design** heading following options are displayed.

- Beam
- Slab
- Column Loads
- Column
- Footing
- Quantity
- Floor Script
- Fdn Script

In Order to create an AutoCAD drawing, a script file has to be created first. To create the script file, click on script Option. A window dialogue box appears . Click on the required file and click on open.

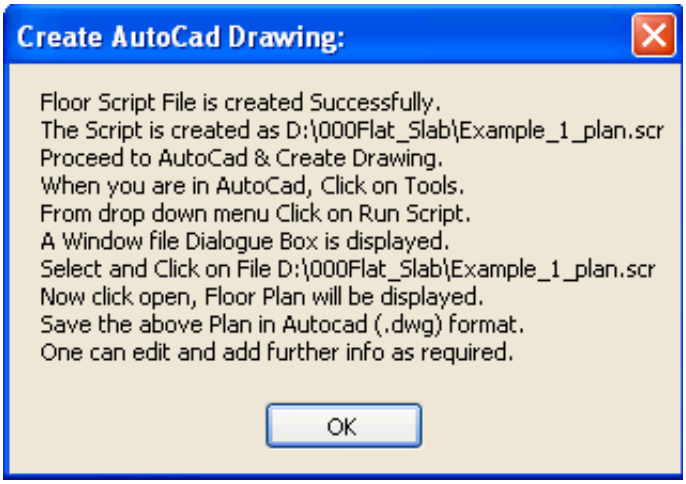


➤ Following graphics is displayed.
Click on Yes if Floor Analysis and Beam Design Options are performed.

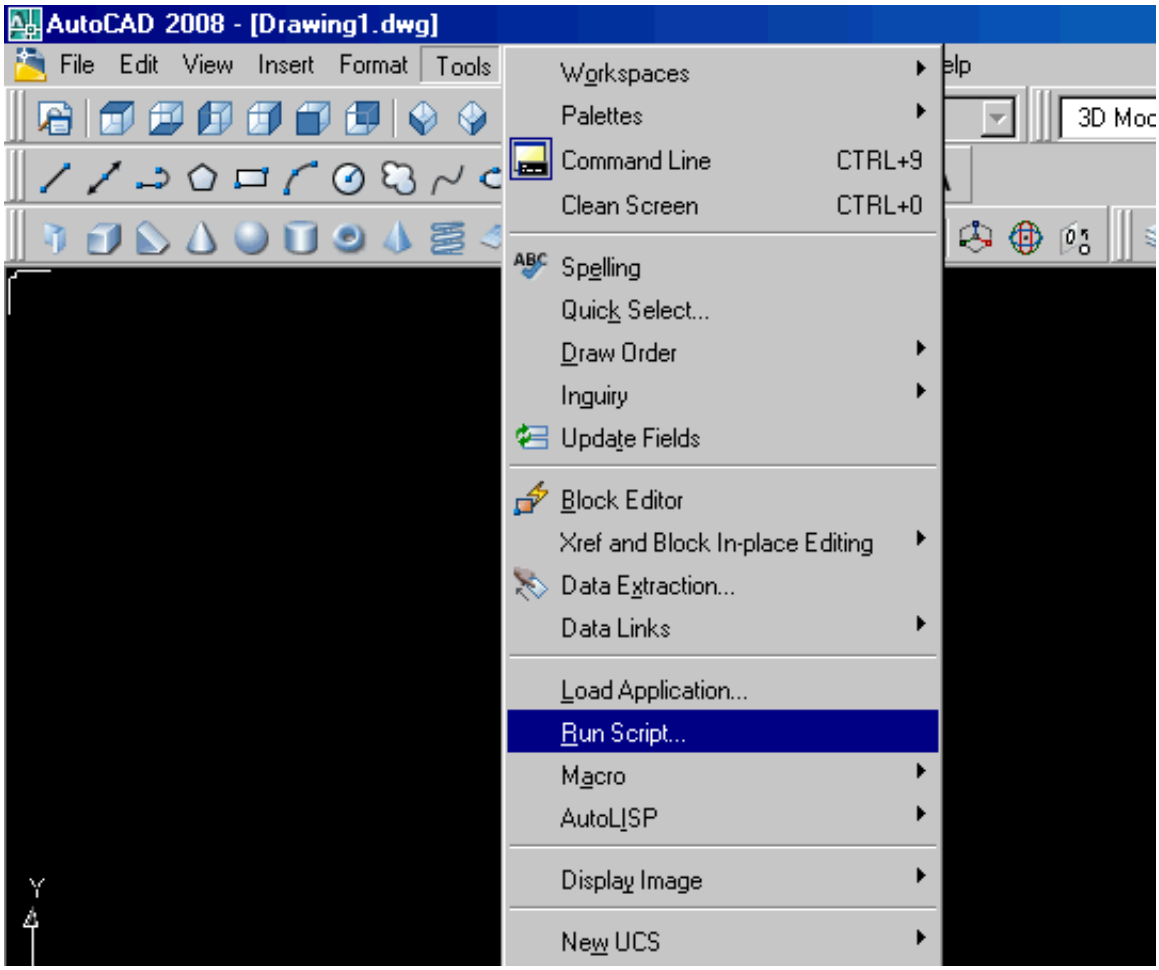


Once Yes is clicked, following graphics is displayed.

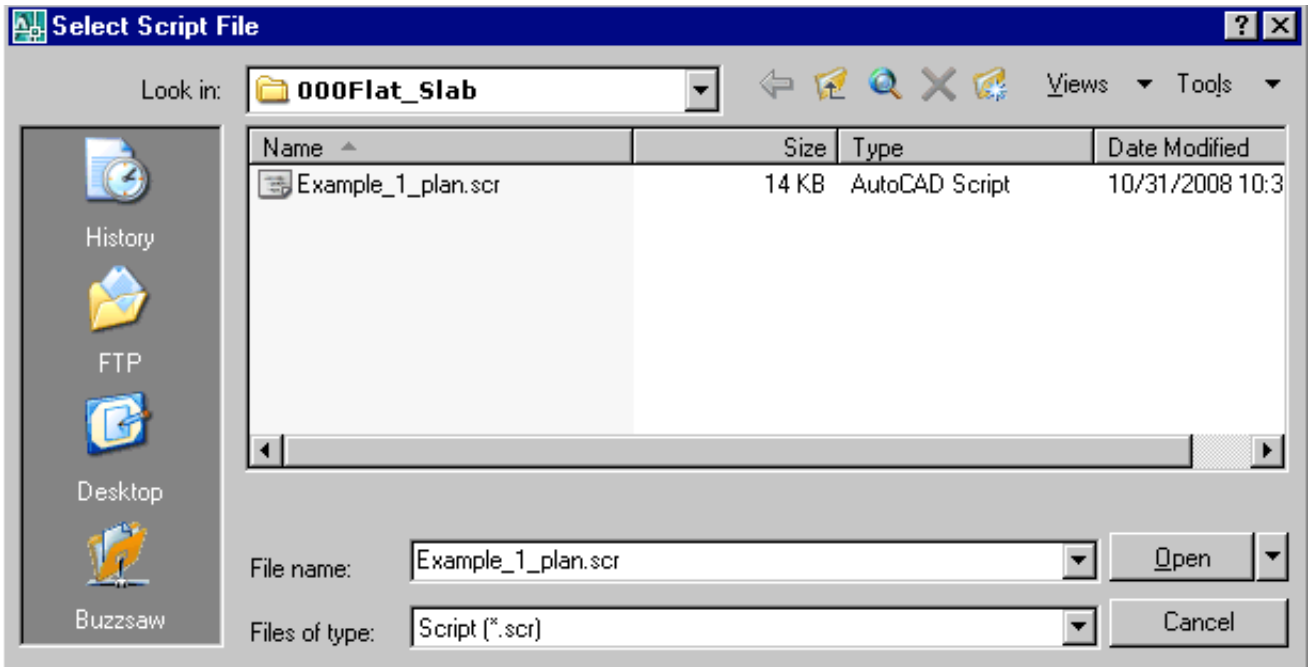
➤ The script file is created as Example_1_plan.scr. Note that "_plan" is added to file name and that .scr stands for script file and not screen saver file.
Now click on OK and Exit from the Program.



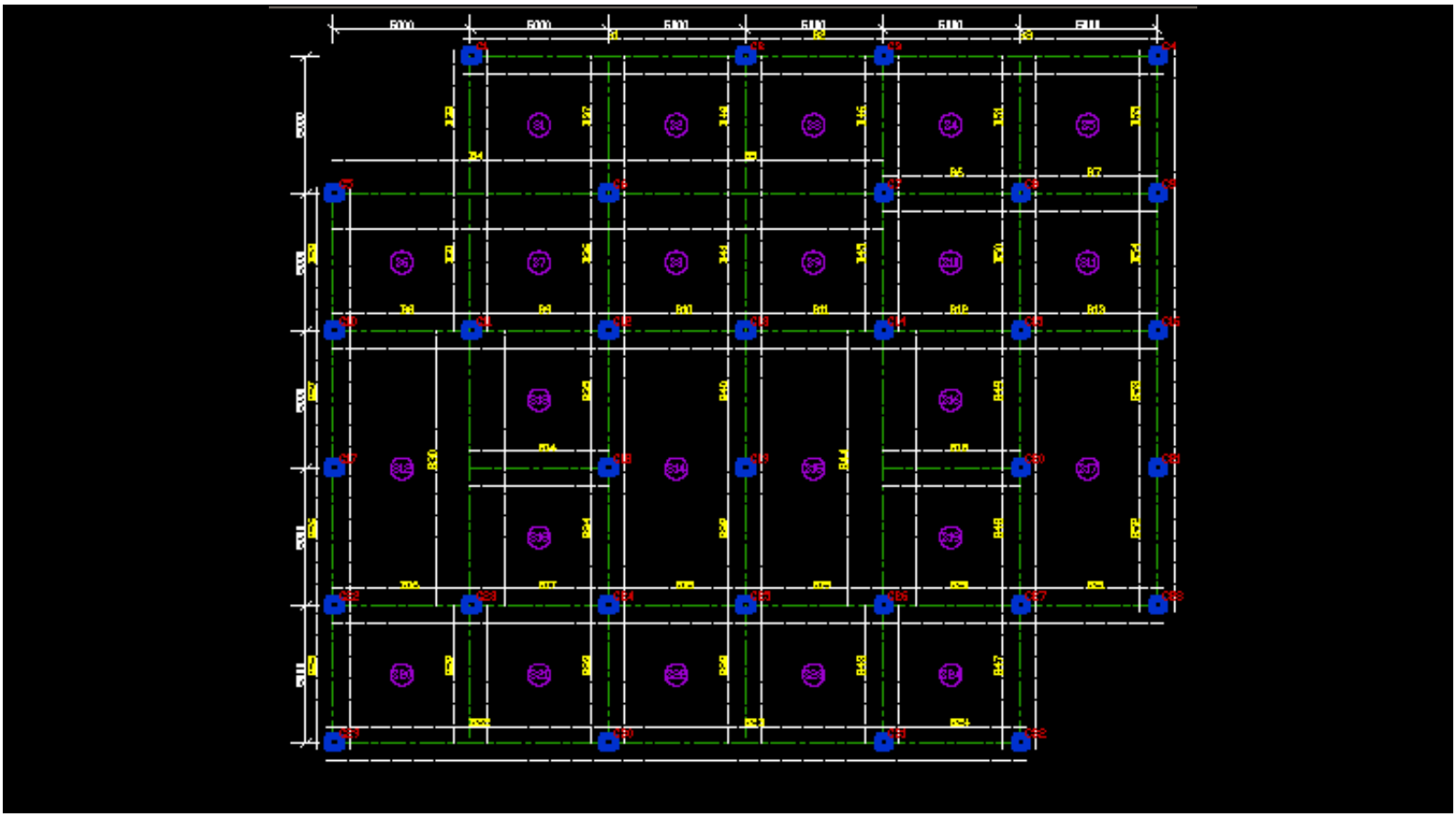
➤ Now Start AutoCAD.
In AutoCAD click on Tools. From the drop down menu click on Run Script.



➤ A window dialogue box appears .
Click on the required file and click open.



➤ It will take a few seconds for the script to run, after which the plan will appear in the form of AutoCAD drawing . The display will be as follows.

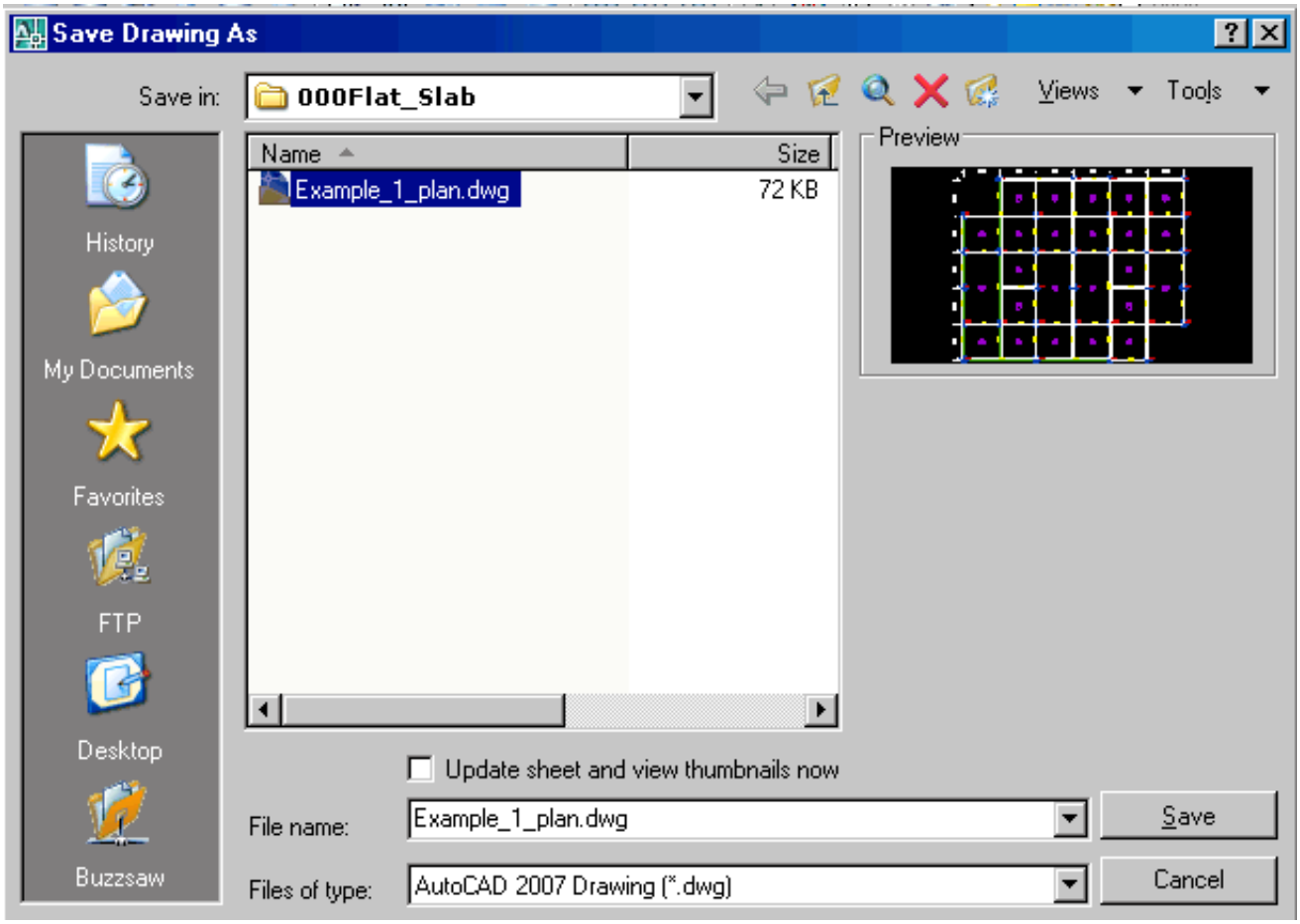


Please note that the above drawing is Editable in AutoCAD.

The above drawing is drawn in the following layers , they are
1) Beam : Denotes beams
2) BeamCen : Denotes center line of the beams
3) Beamtext : Denotes text for beams
4) Column : Denotes Columns
5) Columntext : Denotes text for columns
6) Grids : Denotes dimensions
7) Slabtext : Denotes text for Slab

The layers can be turned Off / On at any time for convenience.
just go to format option and click on layer from the drop down menu.

- Save the above Drawing in AutoCAD i.e. (.dwg) format.



The Procedure for creation of Foundation Plan in AutoCAD is exactly similar to what is described above. Just Click " Fdn Script " button & follow the above procedure.

STEP 13 IS OVER

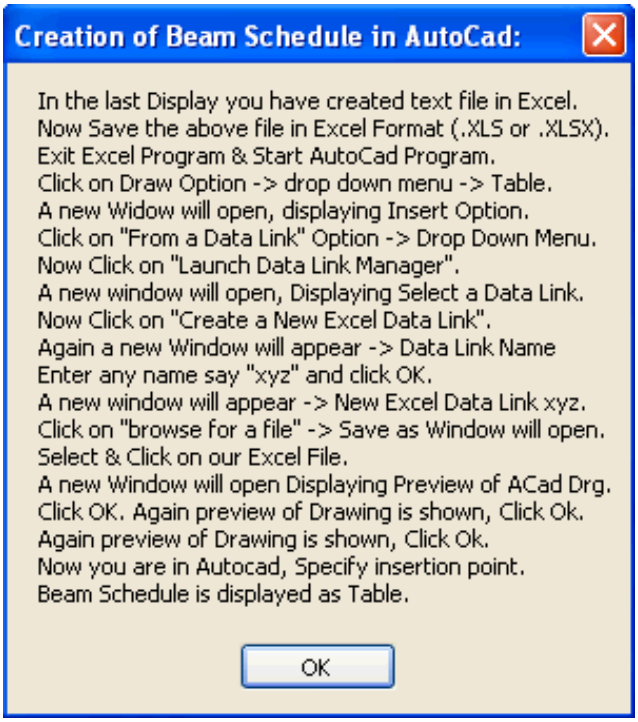
Now lets have a look on creation of Beam Schedule in the next Step....

LEARN FLAT SLAB STEP BY STEP

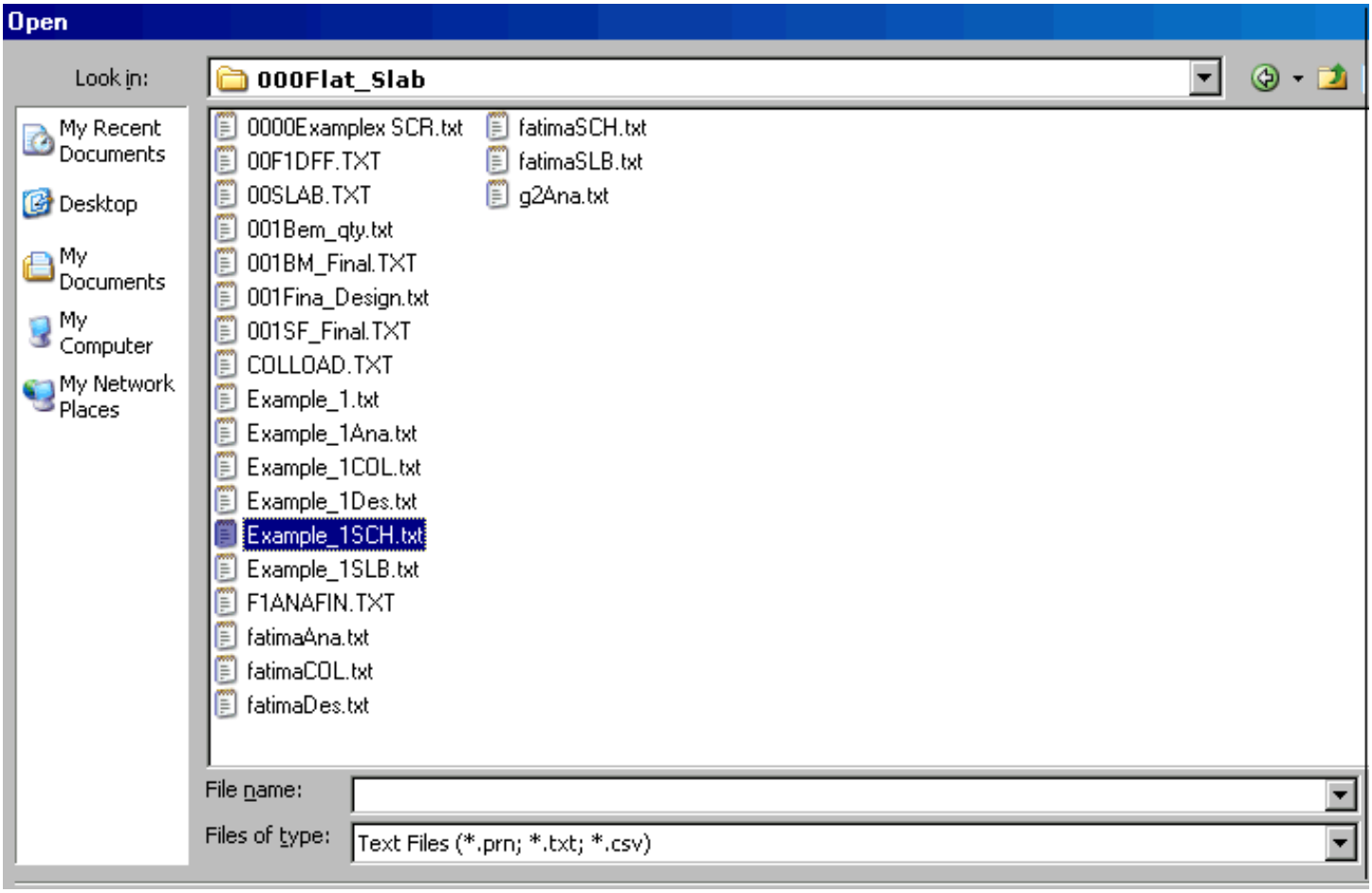
STEP 14: CREATION OF BEAM / COLUMN / FOUNDATION SCHEDULE IN AUTOCAD

Creation of Beam Schedule in AutoCAD requires going through few steps of Excel And AutoCAD.
Let us have a look.....

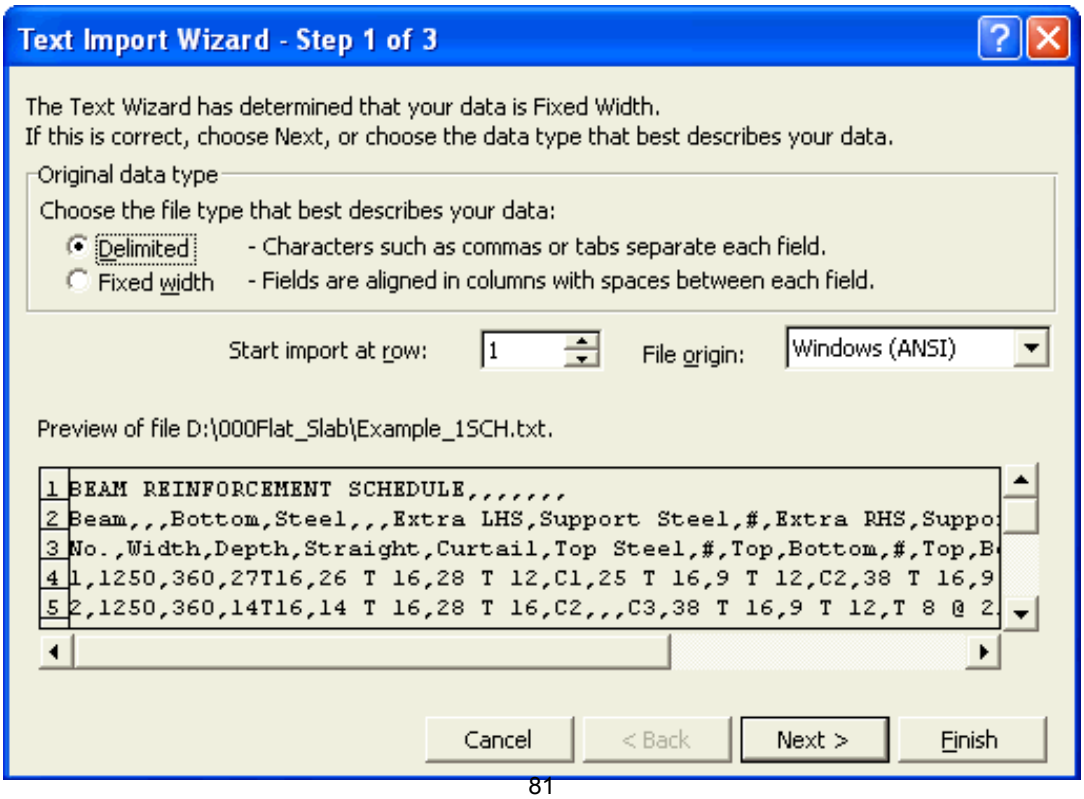
- **When you run the Beam Design Option as illustrated in Step No 11, following Graphics is displayed. We will explain this message in details.**



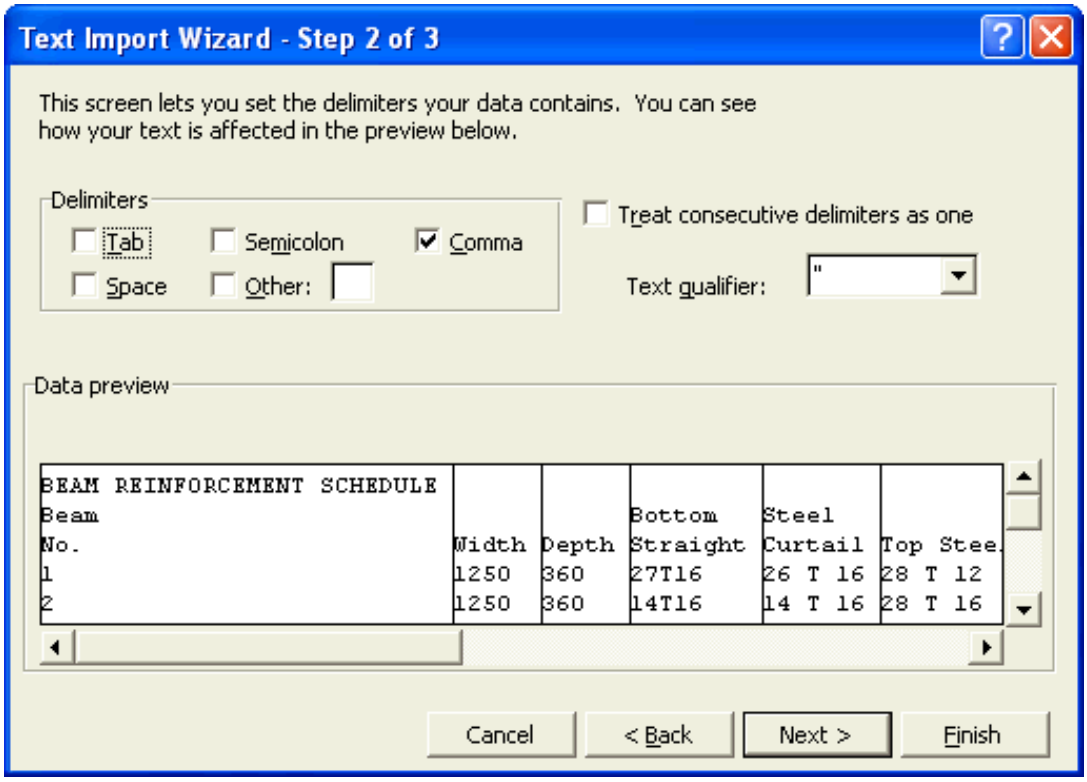
- **Start Microsoft Excel . Click On Open. Following Graphics is Displayed.**



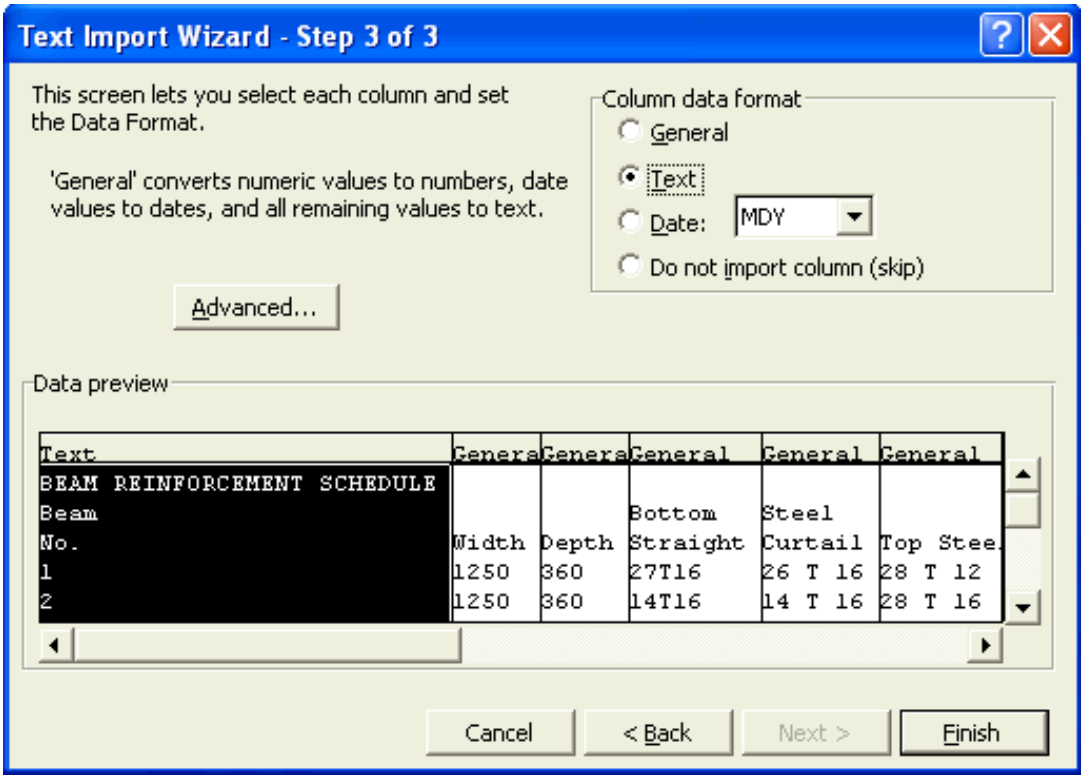
Click on Example_1SCH.txt.
As you can see, the above file is in text format.
In the following steps we will save the file in Excel format.
Once Example1_SCH.txt is clicked, following graphics is displayed.



As shown Above choose Delimited as your Option. Click On Next.
You will see the following dialogue box appear.



As shown Above choose Comma as Delimiter. Click On Next.
Following graphic is displayed.

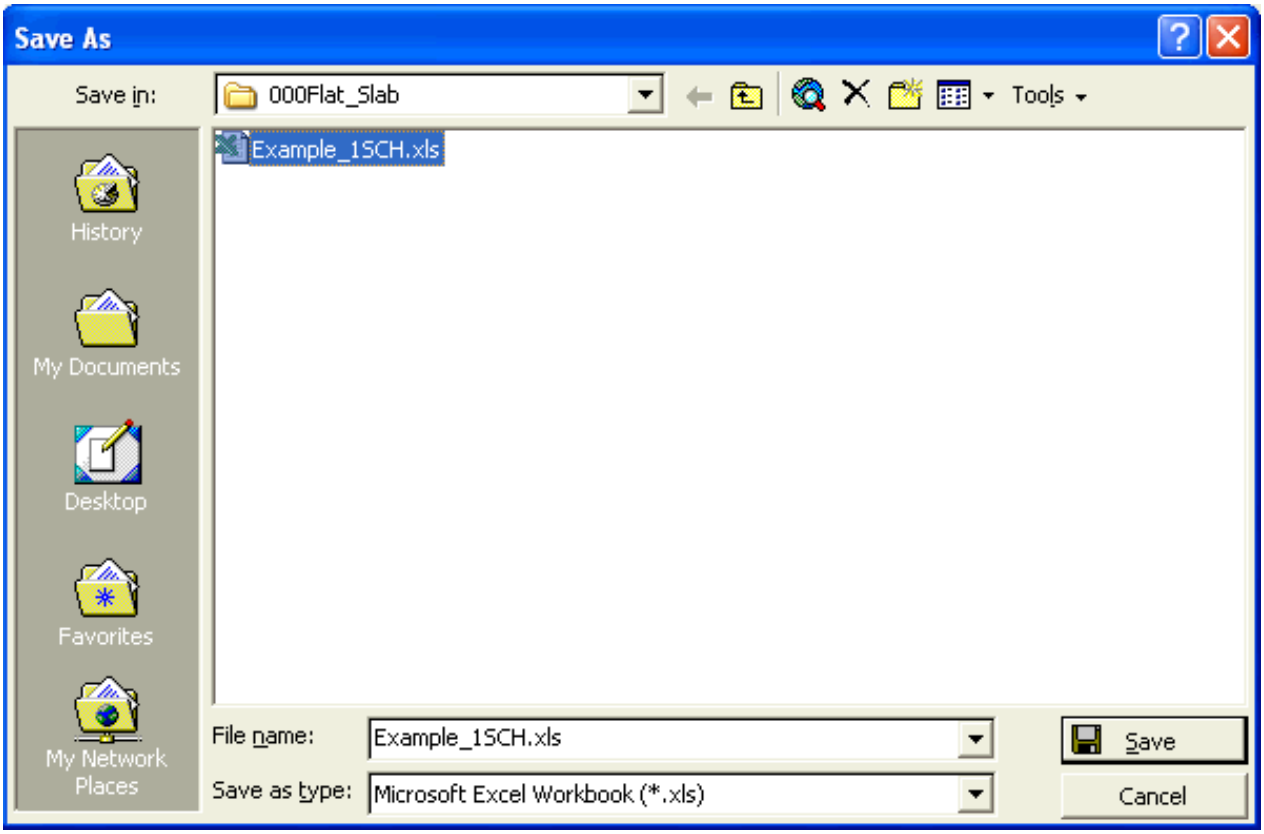


As shown above click on Text and then click on Finish.

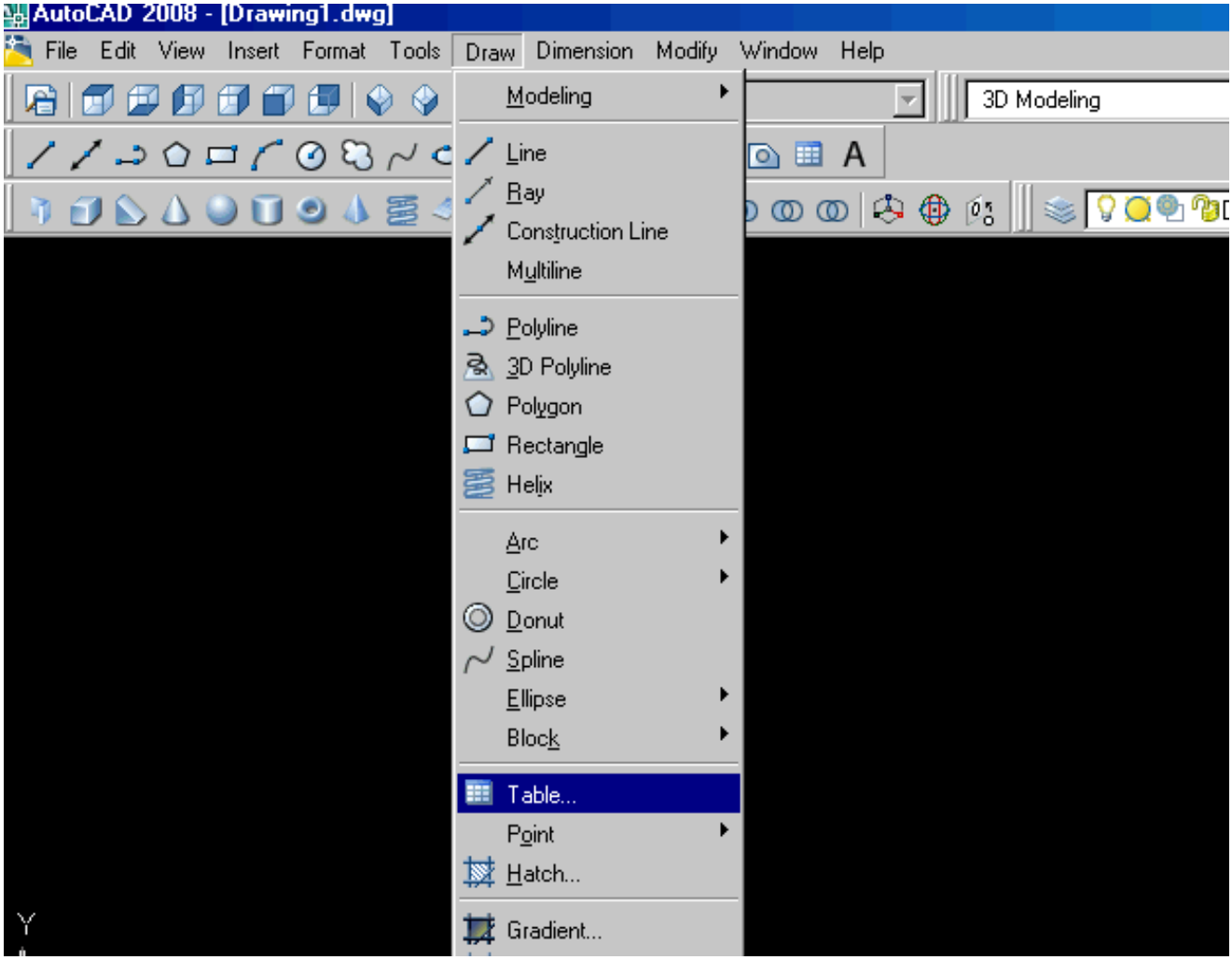
➤ **Here you will see that Beam schedule appears in Excel . Following is a part display. Now You can make any number of changes you want within Excel, like changing fonts, alignment of text, Column Width etc..**

BEAM REINFORCEMENT SCHEDULE												
Beam			Bottom	Steel			Extra LHS	Support Ste	#	Extra RHS	Support Steel		Skin
No.	Width	Depth	Straight	Curtail	Top Stee	#	Top	Bottom	#	Top	Bottom	Stirrups	Steel
1	1250	360	27T16	26 T 16	28 T 12	C1	25 T 16	9 T 12	C2	38 T 16	9 T 12	T 8 @ 235 5 Legged	
2	1250	360	14T16	14 T 16	28 T 16	C2			C3	38 T 16	9 T 12	T 8 @ 210 7 Legged	
3	1250	360	27T16	26 T 16	28 T 12	C3			C4	25 T 16	9 T 12	T 8 @ 210 7 Legged	
4	2500	360	27T16	27 T 16	17 T 12	C5	44 T 20	17 T 12	C6	57 T 20	24 T 12	d 6 @ 600 10 Legged	
5	2500	360	23T20	22 T 20	17 T 12	C6			C7	40 T 16	17 T 12	T 12 @ 135 10 Legged	
6	1250	360	5T12	4 T 12	13 T 12	C7			C8	9 T 12	9 T 12	T 10 @ 165 10 Legged	
7	1250	360	11T12	11 T 12	9 T 12	C8			C9	9 T 12	9 T 12	T 8 @ 370 10 Legged	
8	1250	360	13T12	12 T 12	9 T 12	C1	16 T 12	9 T 12	C11	23 T 12	9 T 12	d 6 @ 600 10 Legged	
9	1250	360	5T12	4 T 12	9 T 12	C11			C12	14 T 12	9 T 12	T 10 @ 160 10 Legged	
10	1250	360	7T12	7 T 12	9 T 12	C12			C13	22 T 12	9 T 12	d 6 @ 350 10 Legged	
11	1250	360	7T12	7 T 12	9 T 12	C13			C14	14 T 12	9 T 12	T 8 @ 520 10 Legged	
12	1250	360	5T12	4 T 12	9 T 12	C14			C15	23 T 12	9 T 12	T 10 @ 180 10 Legged	
13	1250	360	13T12	12 T 12	9 T 12	C15			C16	15 T 12	9 T 12	T 8 @ 395 10 Legged	
14	1250	360	14T12	13 T 12	9 T 12	B30			C18	9 T 12	9 T 12	d 6 @ 600 10 Legged	
15	1250	360	14T12	13 T 12	9 T 12	B44			C20	9 T 12	9 T 12	d 6 @ 600 10 Legged	
16	1250	360	13T12	12 T 12	9 T 12	C2	15 T 12	9 T 12	C23	23 T 12	9 T 12	d 6 @ 600 10 Legged	
17	1250	360	5T12	4 T 12	9 T 12	C23			C24	14 T 12	9 T 12	T 10 @ 155 10 Legged	
18	1250	360	7T12	7 T 12	9 T 12	C24			C25	21 T 12	9 T 12	T 8 @ 410 10 Legged	
19	1250	360	7T12	7 T 12	9 T 12	C25			C26	15 T 12	9 T 12	T 8 @ 385 10 Legged	
20	1250	360	5T12	4 T 12	9 T 12	C26			C27	17 T 12	9 T 12	T 10 @ 170 10 Legged	
21	1250	360	8T12	8 T 12	9 T 12	C27			C28	13 T 12	9 T 12	T 8 @ 215 7 Legged	

➤ **After making all the required changes, don't forget to save the table in Excel i.e. (in .xls) Format . After having saved the file, you are done with Excel part , Exit from Excel and proceed to AutoCAD.**



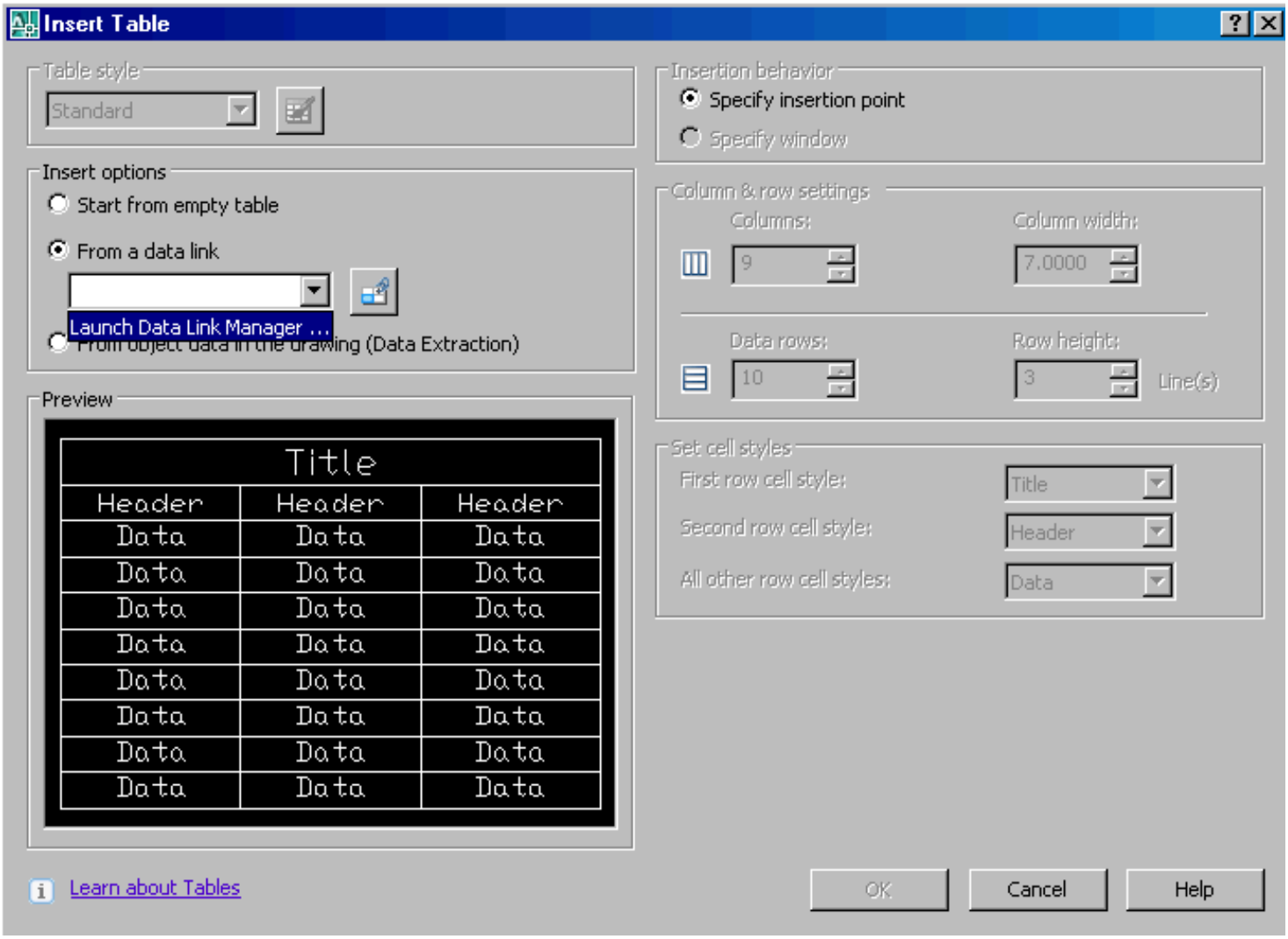
➤ **Start AutoCAD. Click on DRAW . From the drop down menu click on Table a shown below.**



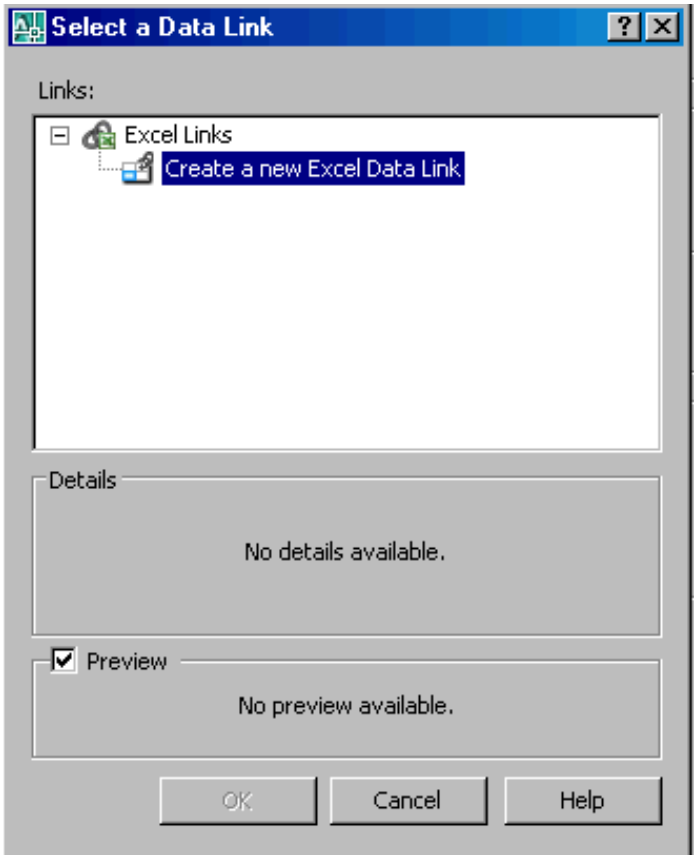
A dialogue box will appear.

As show below click on From a data link .

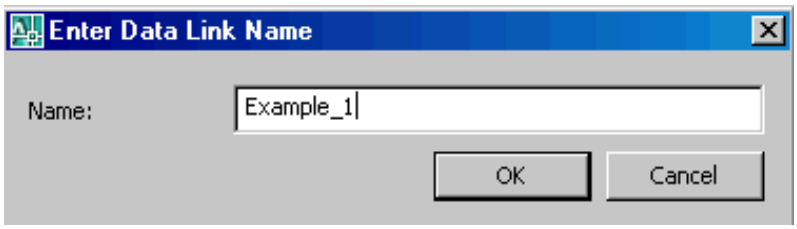
From the drop down menu click on Launch Data Link Manager.



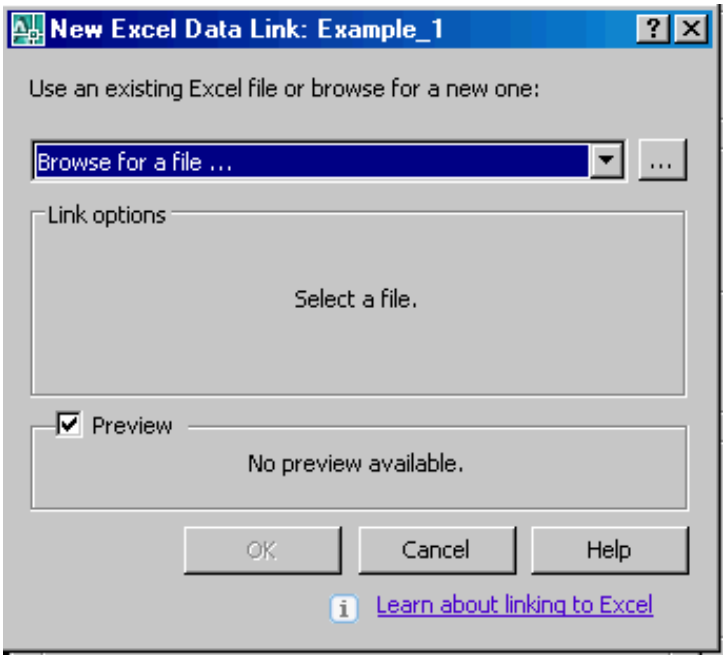
Following graphic is displayed. Click on Create a new Excel Data Link.



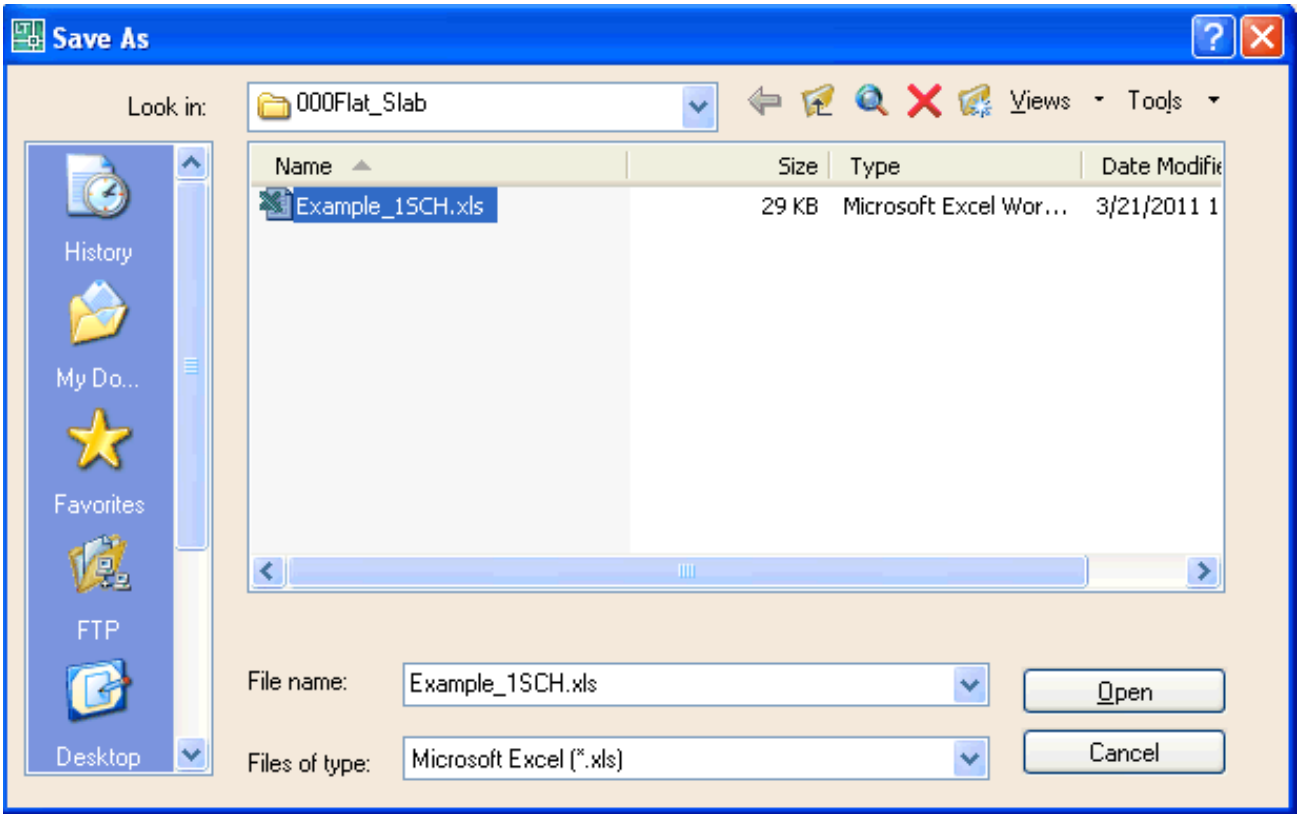
A dialogue box appears asking you to Enter a name.
You can Enter any name for e.g. Example_1.
Click on OK.



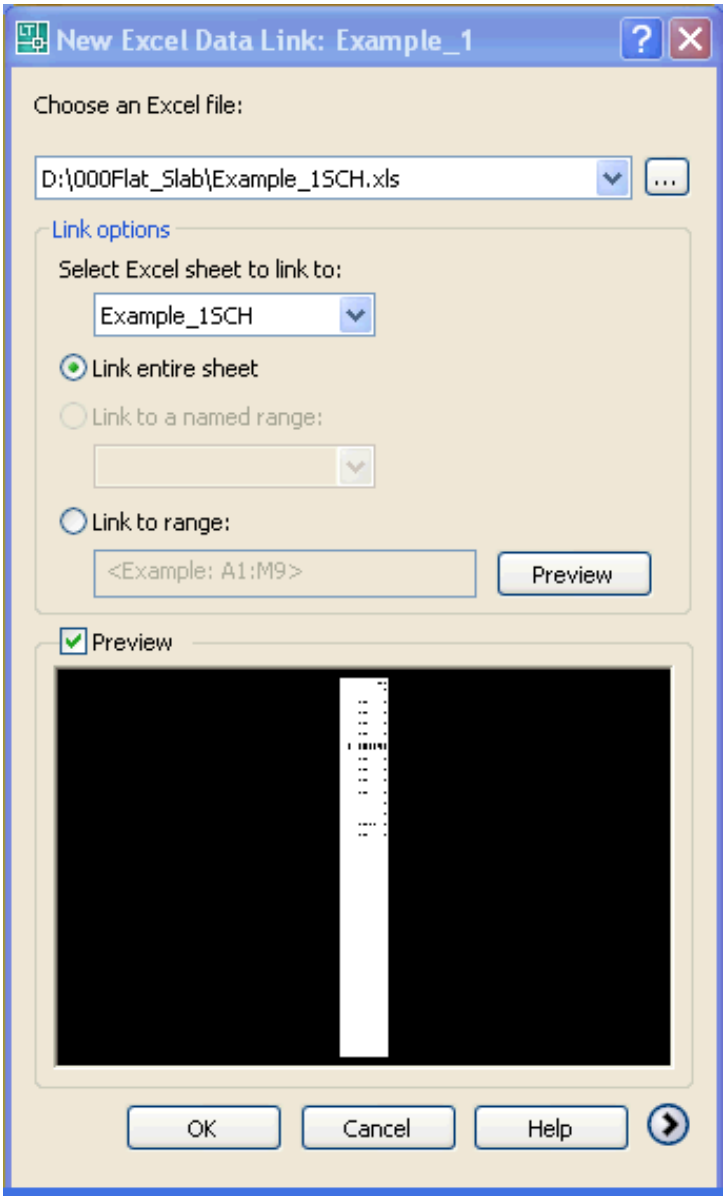
Following Graphics will appear. Click on Browse for a file.



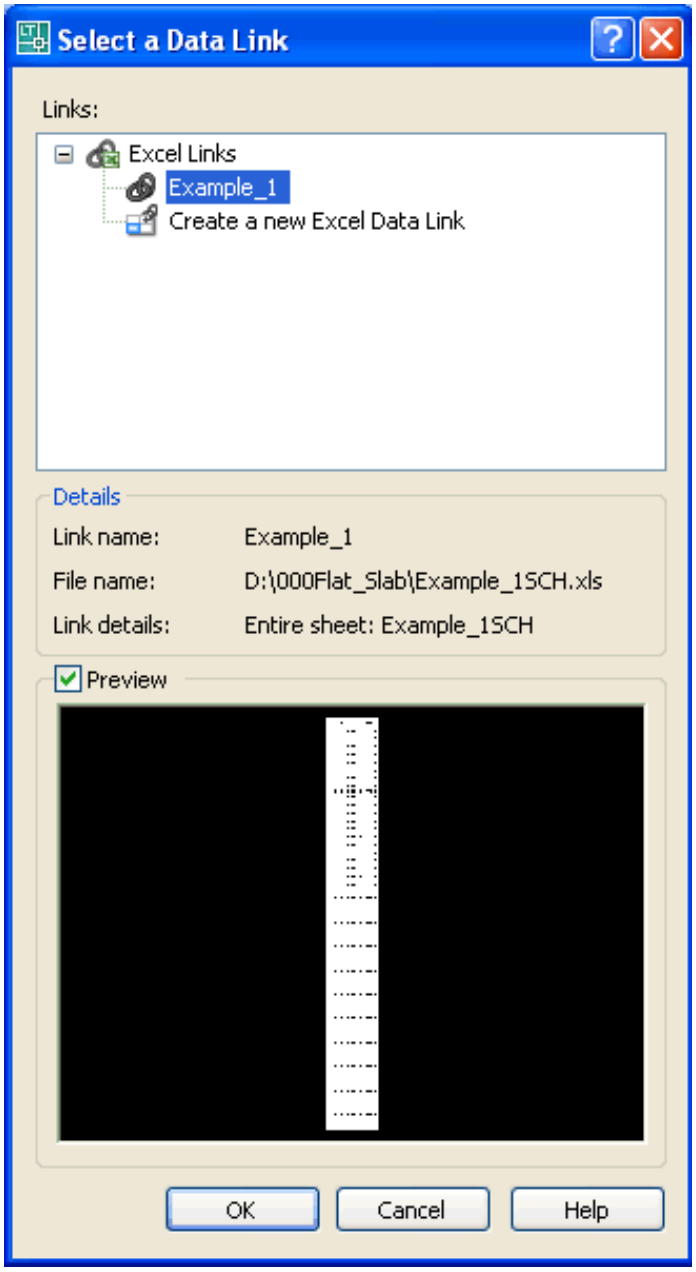
➤ **A Window dialogue box appears. Click on the required file (i.e. the file that we saved previously in Excel format) and click on Open.**



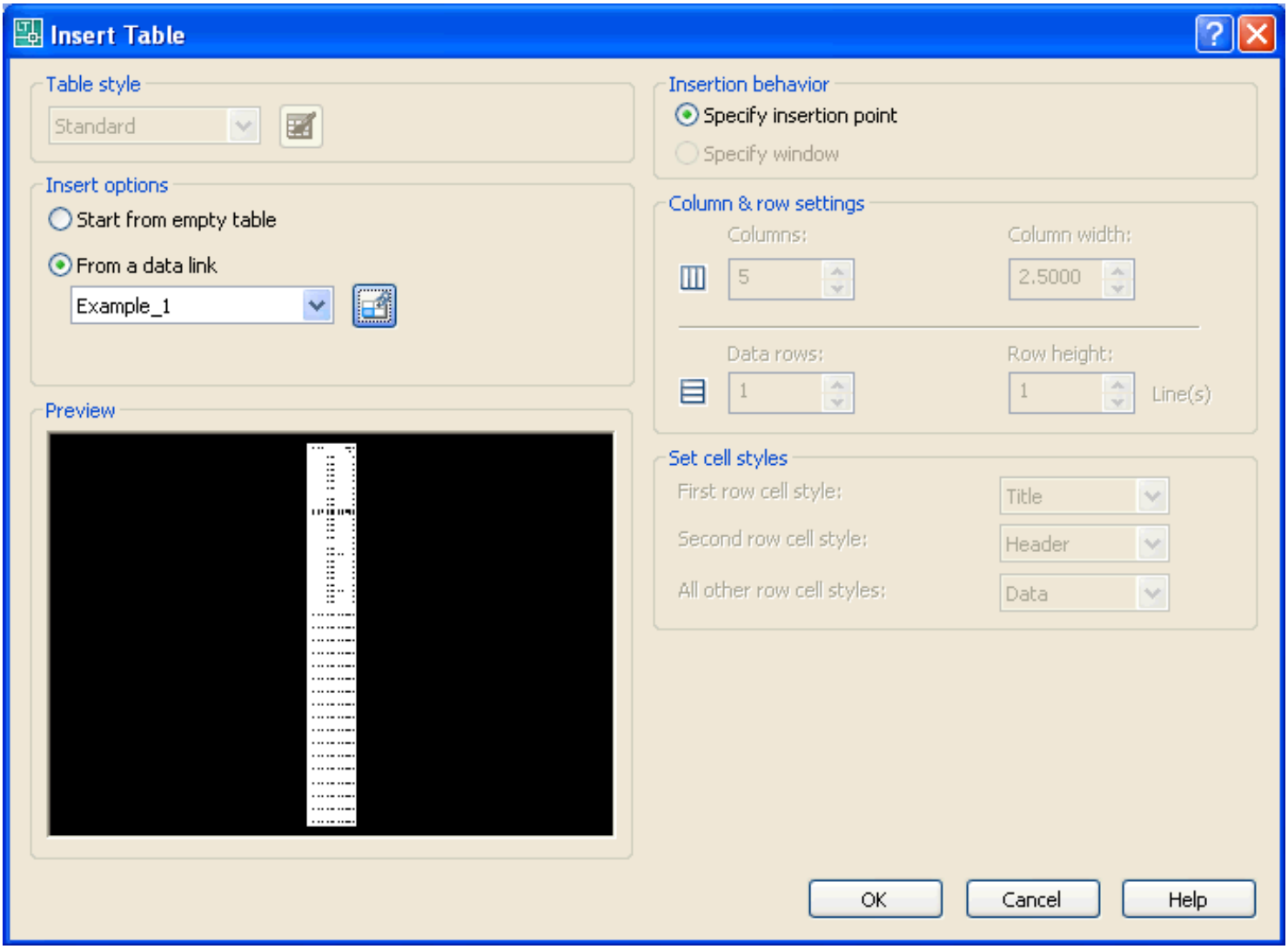
➤ **Following Graphics appears showing the preview of the table in AutoCAD. Click on OK.**



Again a dialogue box appears showing the created link and preview of the table. Click on OK.



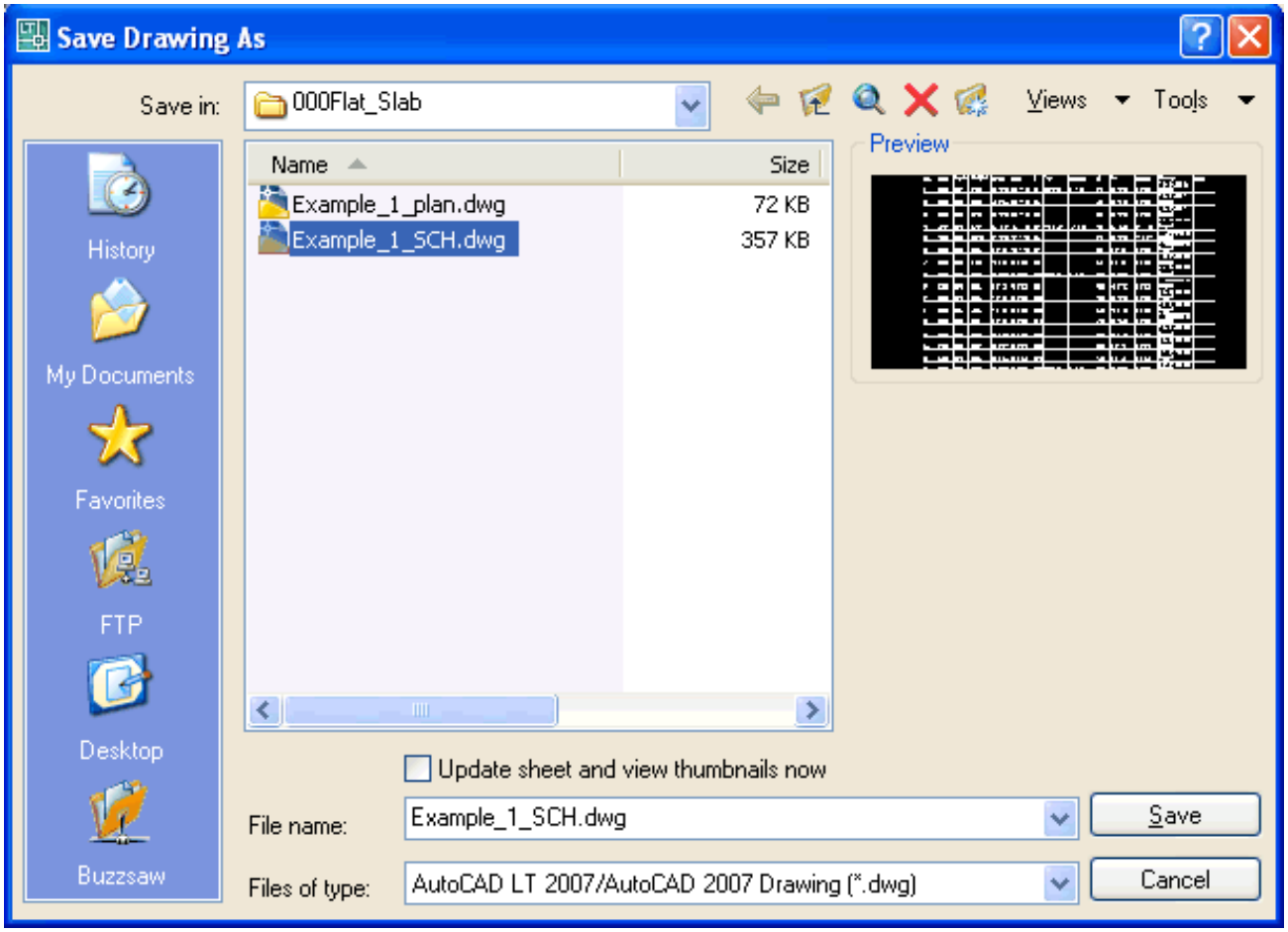
➤ **Another dialogue box appears . Click on OK.**



Now specify an Insertion Point, after which the Beam Schedule will be displayed in the form of AutoCAD drawing. Following is a part display.

BEAM REINFORCEMENT SCHEDULE													
Beam			Bottom	Steel			Extra LHS	Support Steel	#	Extra RHS	Support Steel		Skin
No.	Width	Depth	Straight	Curtail	Top Steel	#	Top	Bottom	#	Top	Bottom	Stirrups	Steel
1	1250	360	27T16	25 T 16	26 T 12	C1	25 T 16	9 T 12	C2	38 T 16	9 T 12	T 8 @ 235 5 Legged	
2	1250	360	14T16	14 T 16	26 T 16	C2			C3	38 T 16	9 T 12	T 8 @ 210 7 Legged	
3	1250	360	27T16	25 T 16	26 T 12	C3			C4	25 T 16	9 T 12	T 8 @ 210 7 Legged	
4	2500	360	27T16	27 T 16	17 T 12	C5	44 T 20	17 T 12	C6	57 T 20	24 T 12	d 8 @ 600 10 Legged	
5	2500	360	23T20	22 T 20	17 T 12	C6			C7	40 T 16	17 T 12	T 12 @ 135 10 Legged	
6	1250	360	5T12	4 T 12	13 T 12	C7			C8	9 T 12	9 T 12	T 10 @ 165 10 Legged	
7	1250	360	11T12	11 T 12	9 T 12	C8			C9	9 T 12	9 T 12	T 8 @ 370 10 Legged	
8	1250	360	13T12	12 T 12	9 T 12	C10	16 T 12	9 T 12	C11	23 T 12	9 T 12	d 8 @ 600 10 Legged	
9	1250	360	5T12	4 T 12	9 T 12	C11			C12	14 T 12	9 T 12	T 10 @ 160 10 Legged	
10	1250	360	7T12	7 T 12	9 T 12	C12			C13	22 T 12	9 T 12	d 8 @ 360 10 Legged	
11	1250	360	7T12	7 T 12	9 T 12	C13			C14	14 T 12	9 T 12	T 8 @ 520 10 Legged	
12	1250	360	5T12	4 T 12	9 T 12	C14			C15	23 T 12	9 T 12	T 10 @ 180 10 Legged	
13	1250	360	13T12	12 T 12	9 T 12	C15			C16	15 T 12	9 T 12	T 8 @ 395 10 Legged	
14	1250	360	14T12	13 T 12	9 T 12	B30			C18	9 T 12	9 T 12	d 8 @ 600 10 Legged	
15	1250	360	14T12	13 T 12	9 T 12	B44			C20	9 T 12	9 T 12	d 8 @ 600 10 Legged	
16	1250	360	13T12	12 T 12	9 T 12	C22	15 T 12	9 T 12	C23	23 T 12	9 T 12	d 8 @ 600 10 Legged	
17	1250	360	5T12	4 T 12	9 T 12	C23			C24	14 T 12	9 T 12	T 10 @ 155 10 Legged	

Finally, don't forget to save the above drawing in AutoCAD (i.e. . dwg) format.



➤ **The Procedure for creation of Column and Foundation Schedule in AutoCAD is exactly similar to what is described above.**

STEP 14 IS OVER

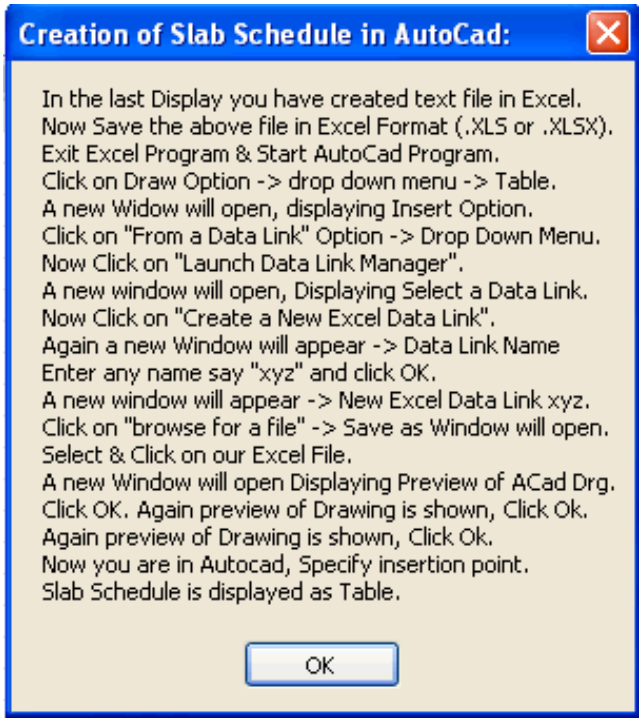
Now lets have a look on creation of Slab Schedule in the next Step....

LEARN FLAT SLAB STEP BY STEP

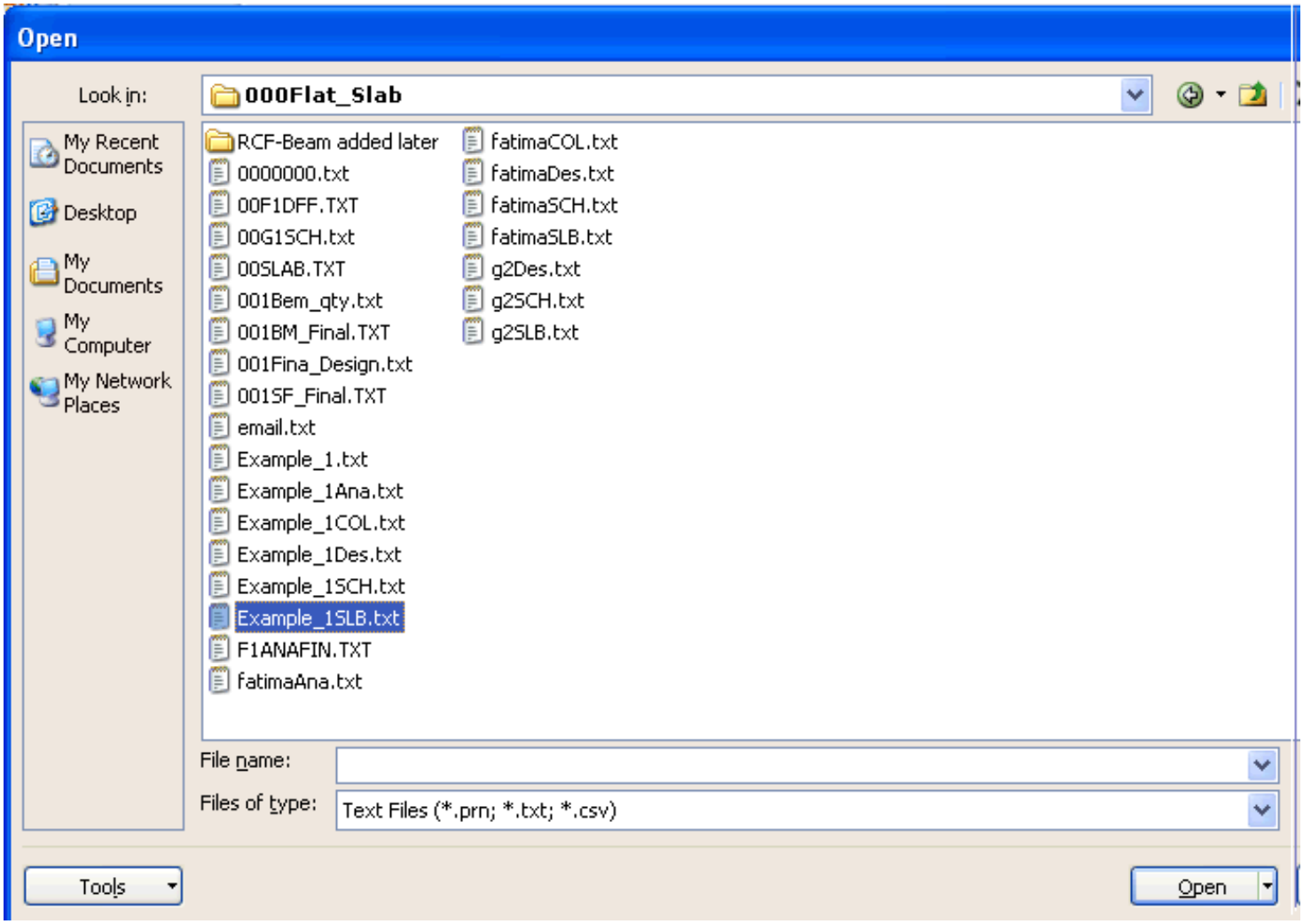
STEP 15: CREATION OF SLAB SCHEDULE IN AUTOCAD

Creation of Slab Schedule in AutoCAD is almost same as that of beam schedule with just a few changes here and there ....

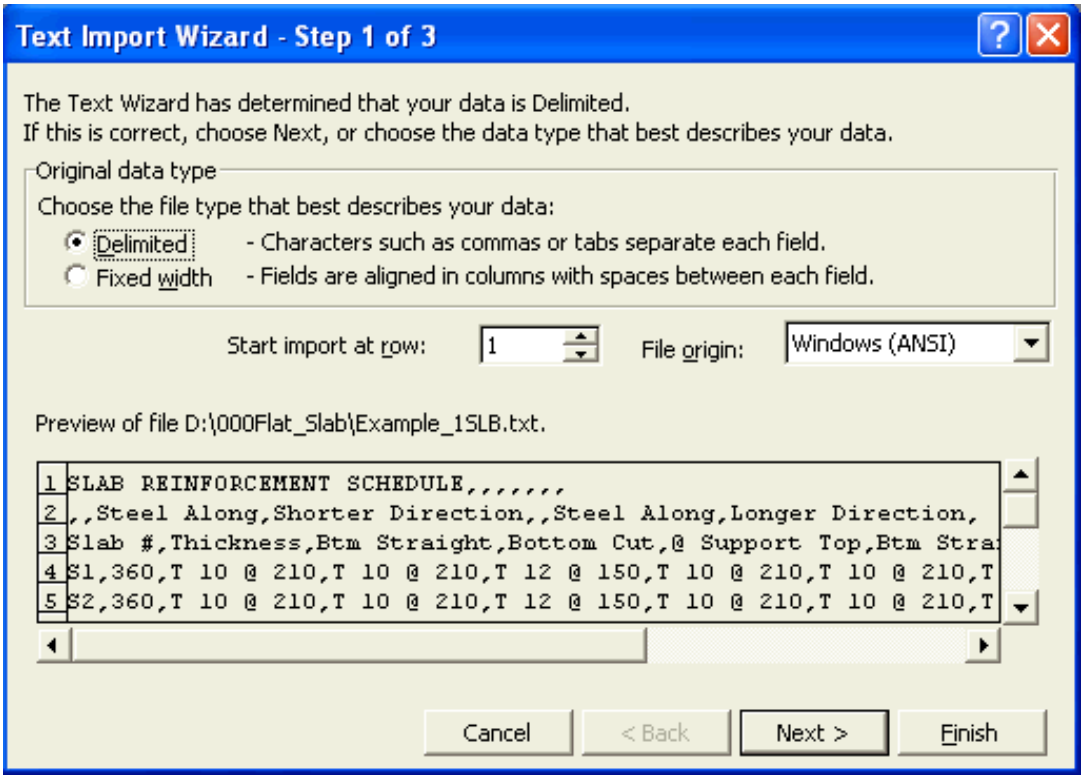
- **When you run the Slab Design Option as illustrated in Step No 11 , following Graphics is displayed. We will explain this message in detail.**



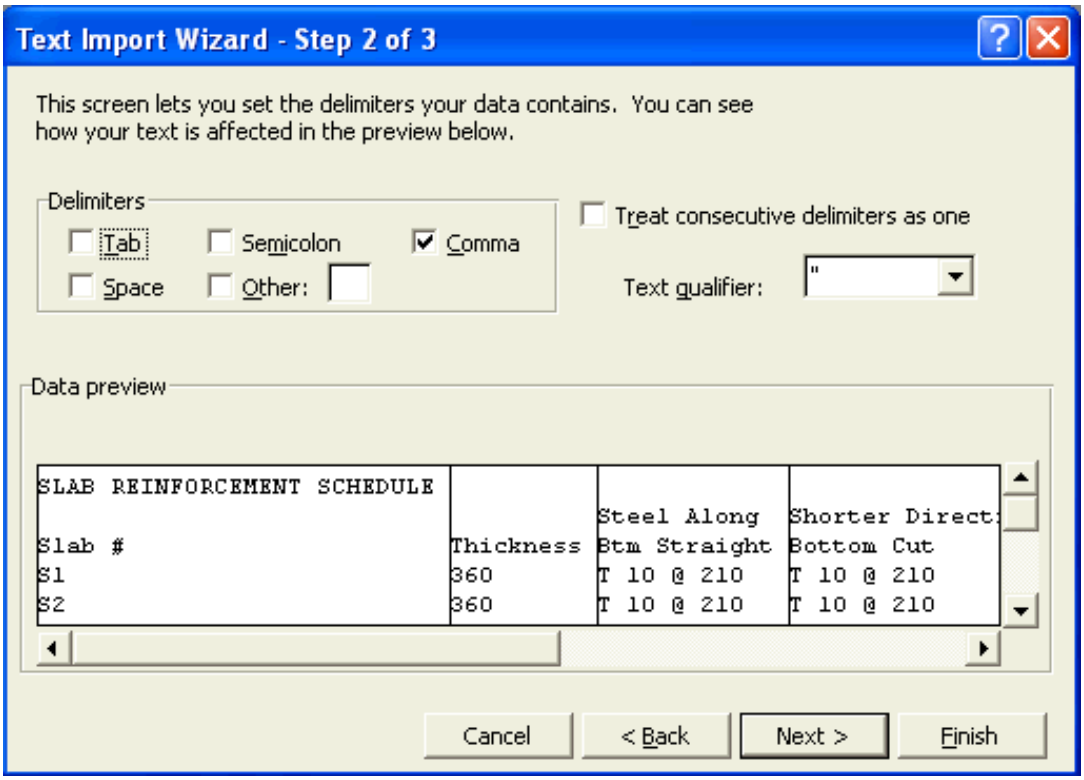
- **Start Microsoft Excel . Click On Open. Following Graphics is Displayed.**



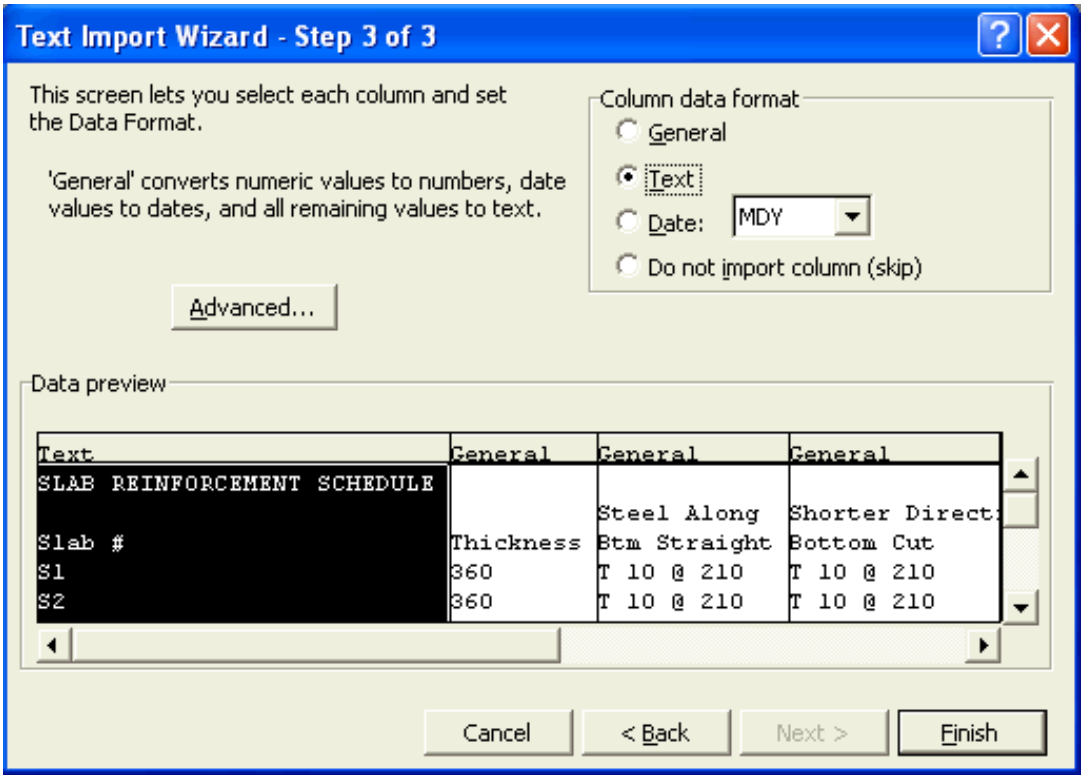
Click on Example_1SLB.txt.
As you can see, the above file is in text format.
In the following steps we will save the file in Excel format.
Once Example1_SLB.txt is clicked, following graphics is displayed.



As shown Above choose Delimited as your Option. Click On Next.
You will see the following dialogue box appear.



As shown Above choose Tab and comma as Delimiters. Click On Next.
Following graphics are displayed.



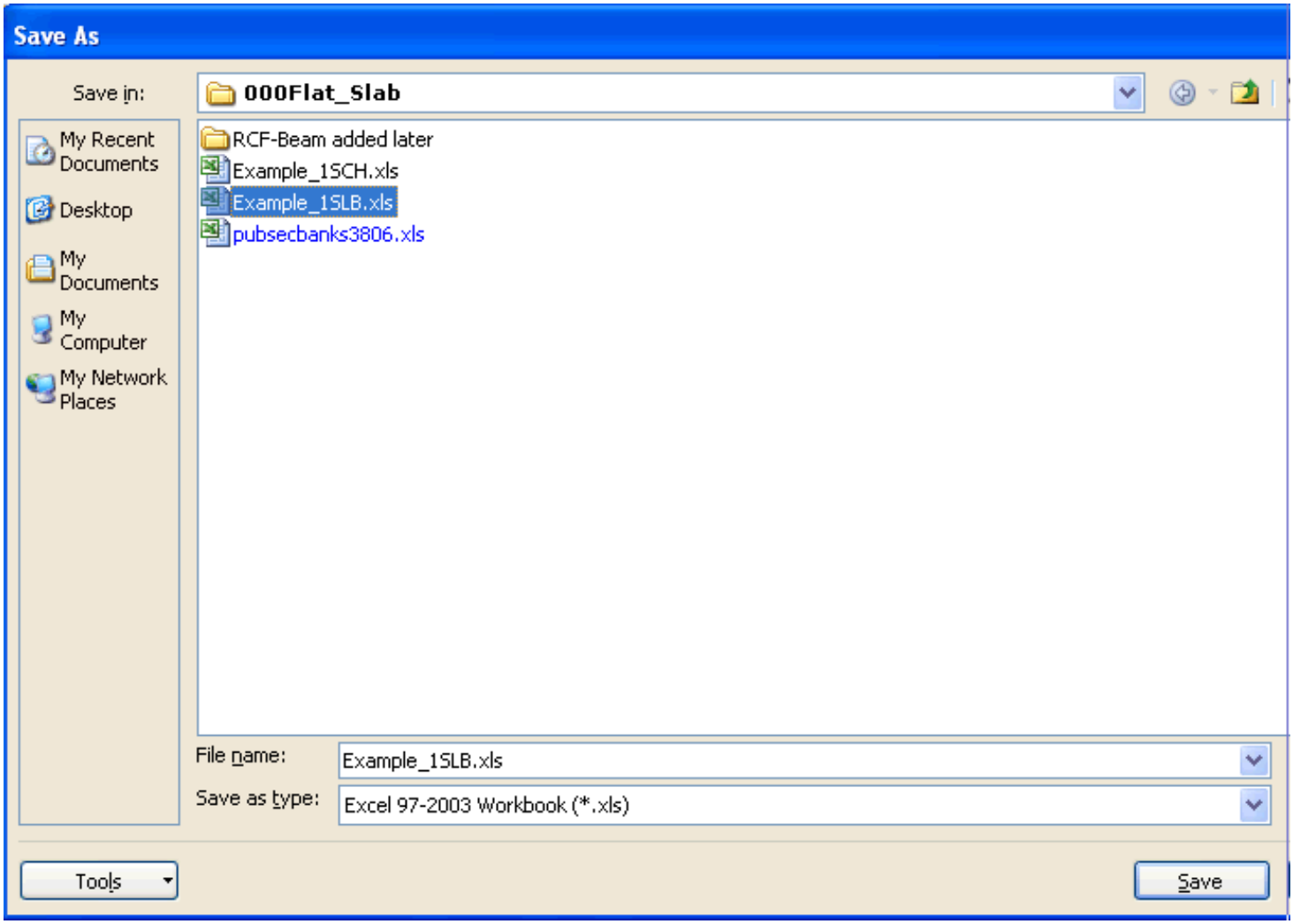
As shown above click on Text and then click on Finish.

Here you will see that Slab schedule appears in Excel . Following is a part display.

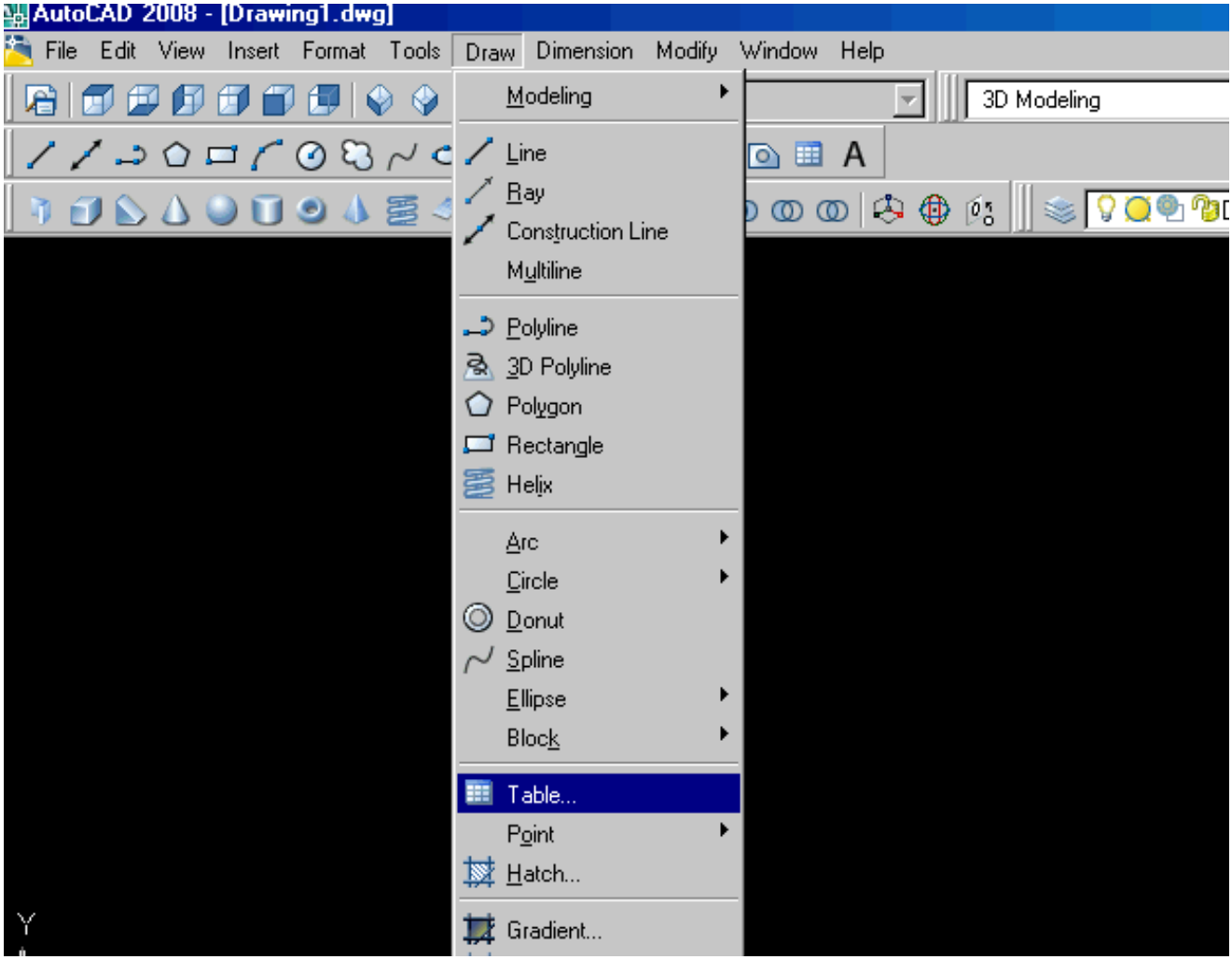
Now You can make any no of changes you want within Excel, like changing fonts, alignment of text, Column Width etc..

SLAB REINFORCEMENT SCHEDULE							
		Steel Along	Shorter Direction		Steel Along	Longer Direction	
Slab #	Thickness	Btm Straight	Bottom Cut	@ Support Top	Btm Straight	Bottom Cut	@ Support Top
S1	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S2	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S3	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S4	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S5	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S6	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S7	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S8	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S9	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S10	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S11	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S12	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S13	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S14	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S15	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S16	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S17	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S18	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S19	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S20	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150

After making all the required changes, don't forget to save the table in Excel i.e. (in .xls) Format . After having saved the file, you are done with Excel part , Exit from Excel and proceed to AutoCAD.



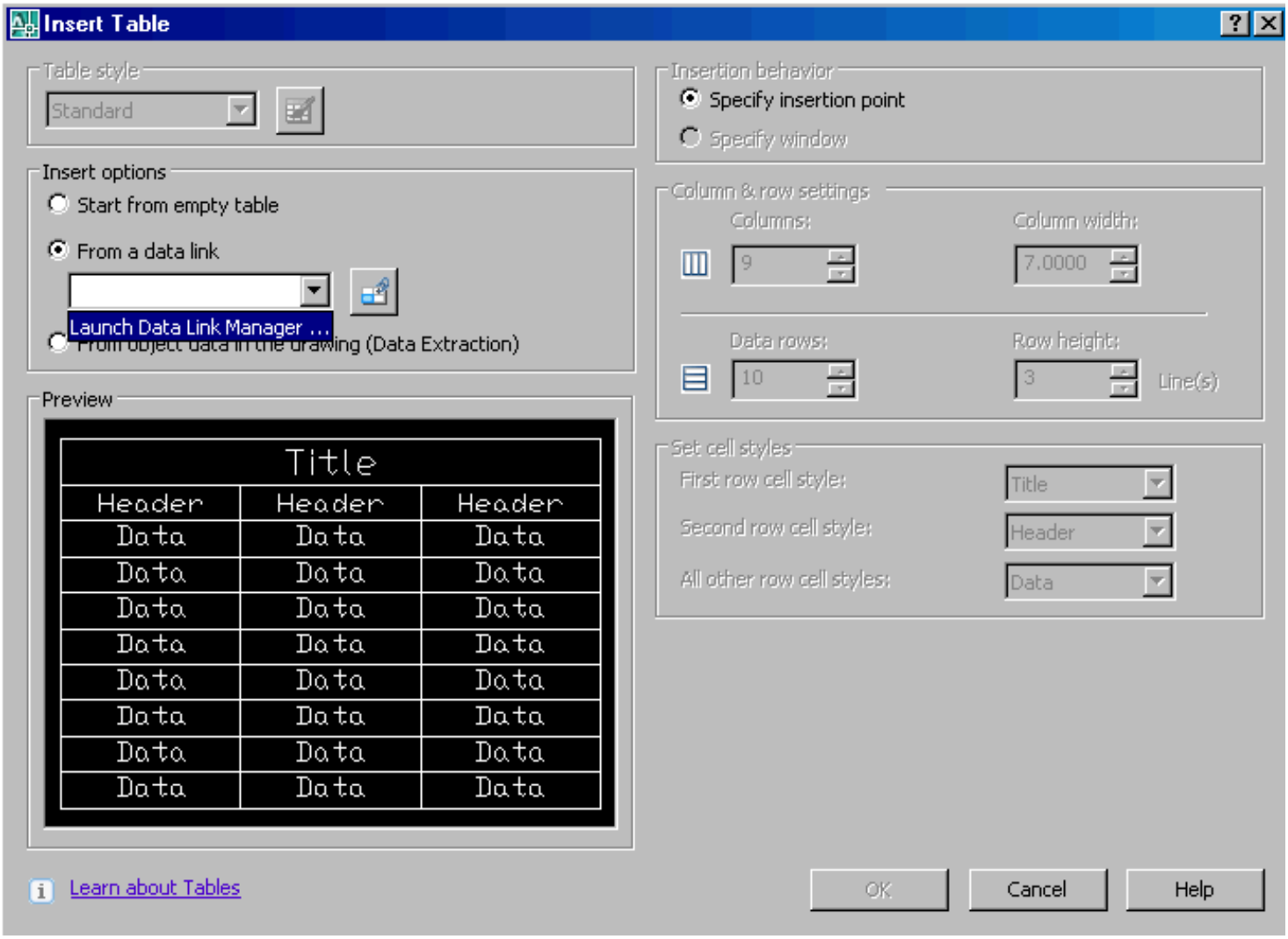
Start AutoCAD. Click on DRAW . From the drop down menu click on Table a shown below.



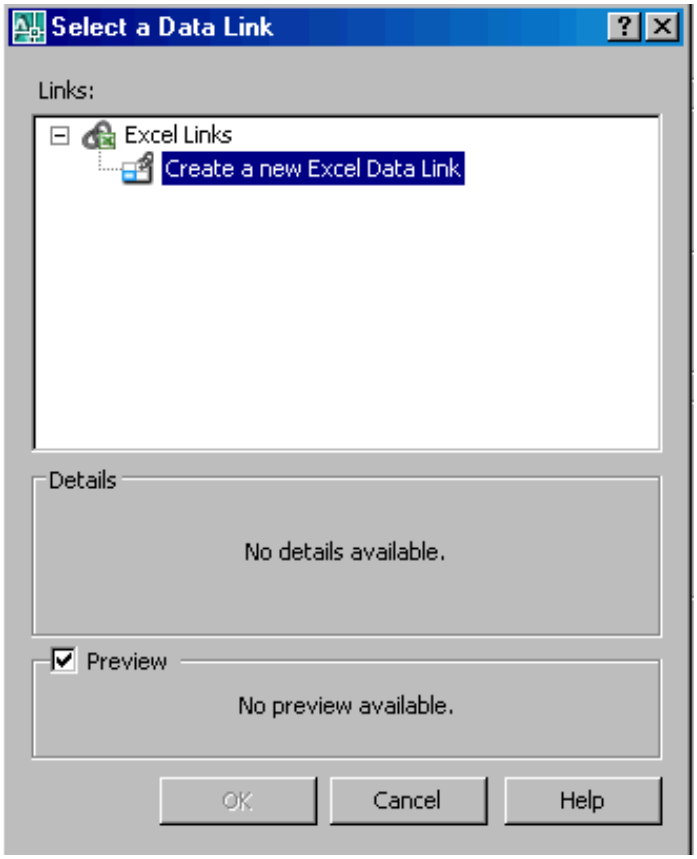
A dialogue box will appear.

As show below click on From a data link .

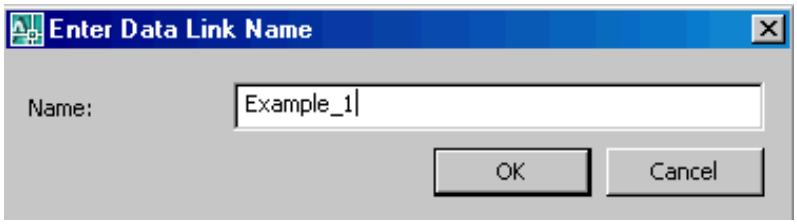
From the drop down menu click on Launch Data Link Manager.



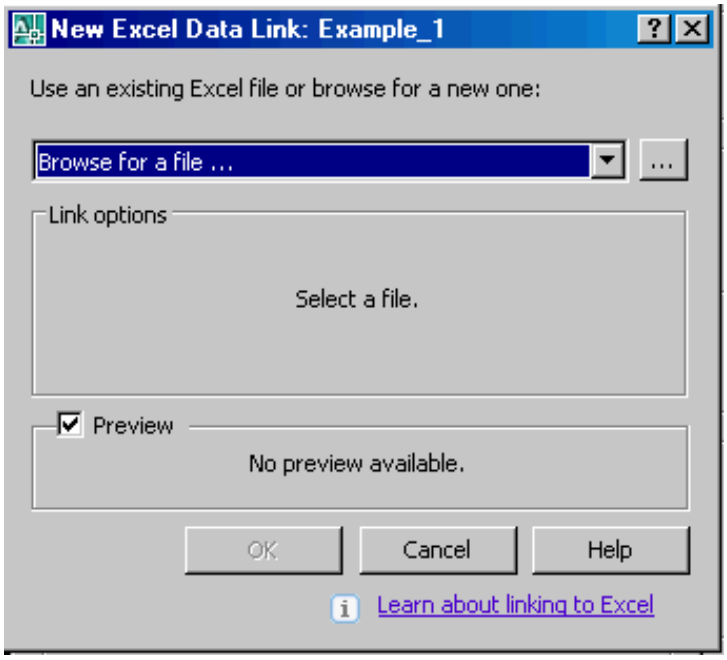
Following graphics are displayed. Click on Create a new Excel Data Link.



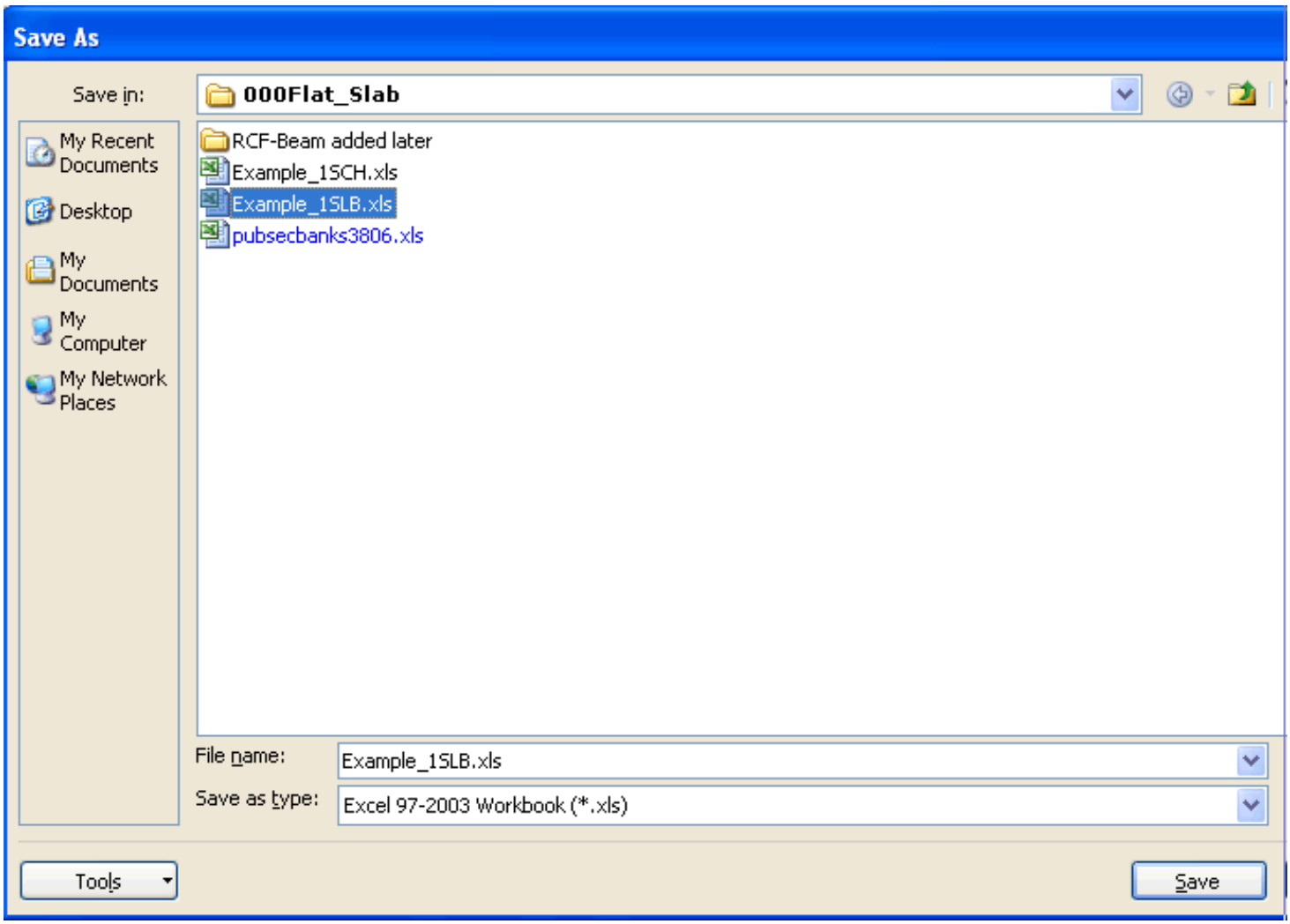
A dialogue box appears asking you to Enter a name.
You can Enter any name for e.g. Example_1.
Click on OK.



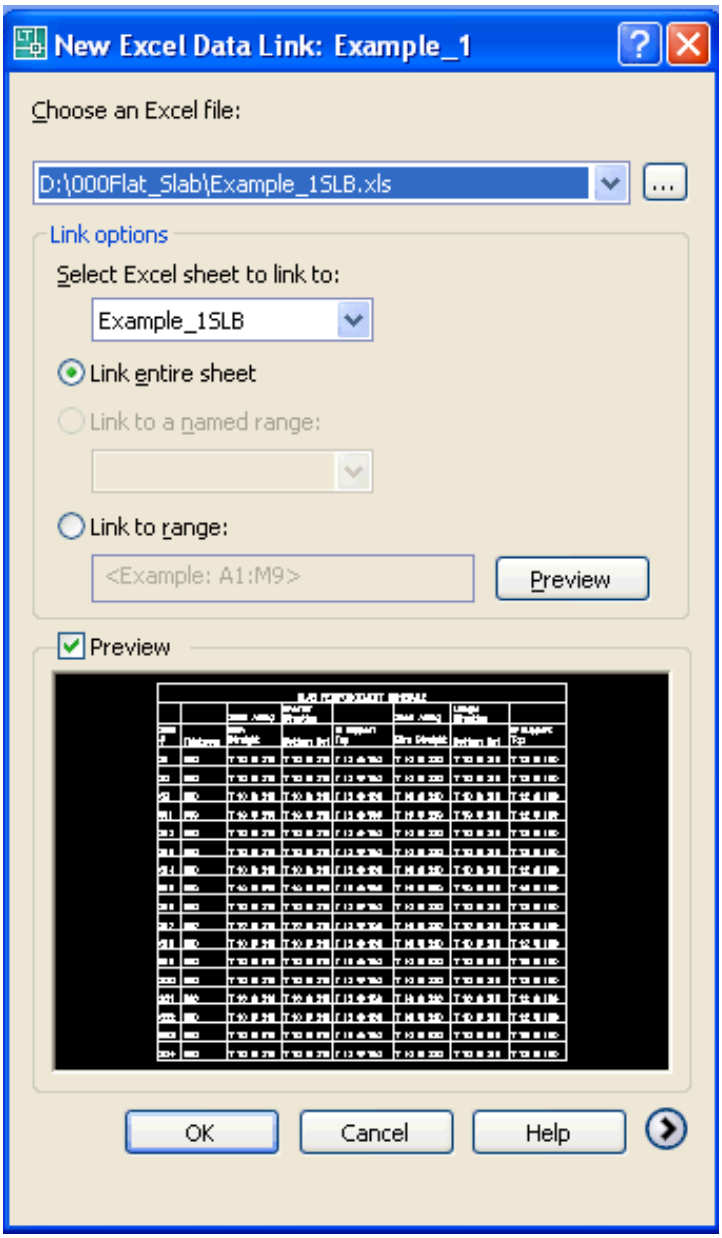
Following Graphics will appear. Click on Browse for a file.



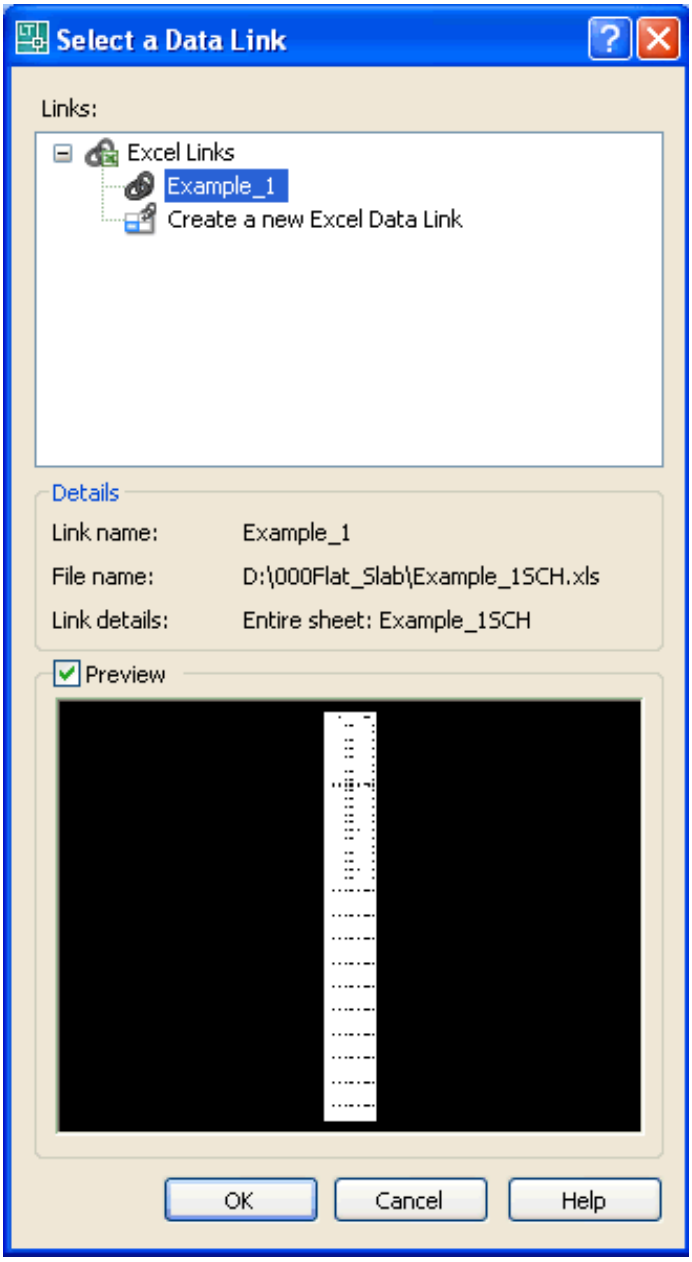
➤ **A Window dialogue box appears. Click on the required file (i.e. the file that we saved previously in Excel format) and click on Open.**



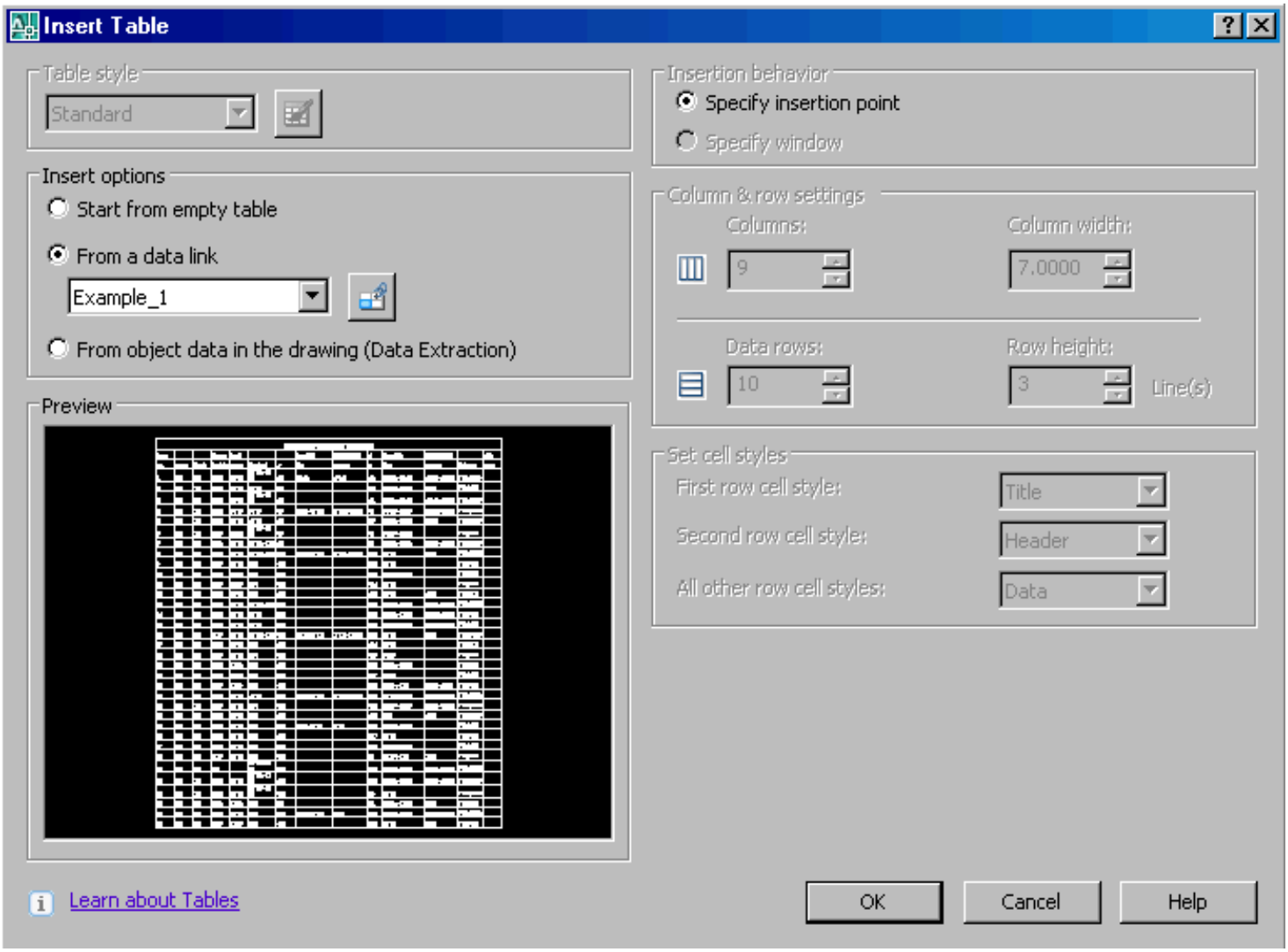
Following Graphics appears showing the preview of the table in AutoCAD. Click on OK.



Again a dialogue box appears showing the created link and preview of the table. Click on OK.



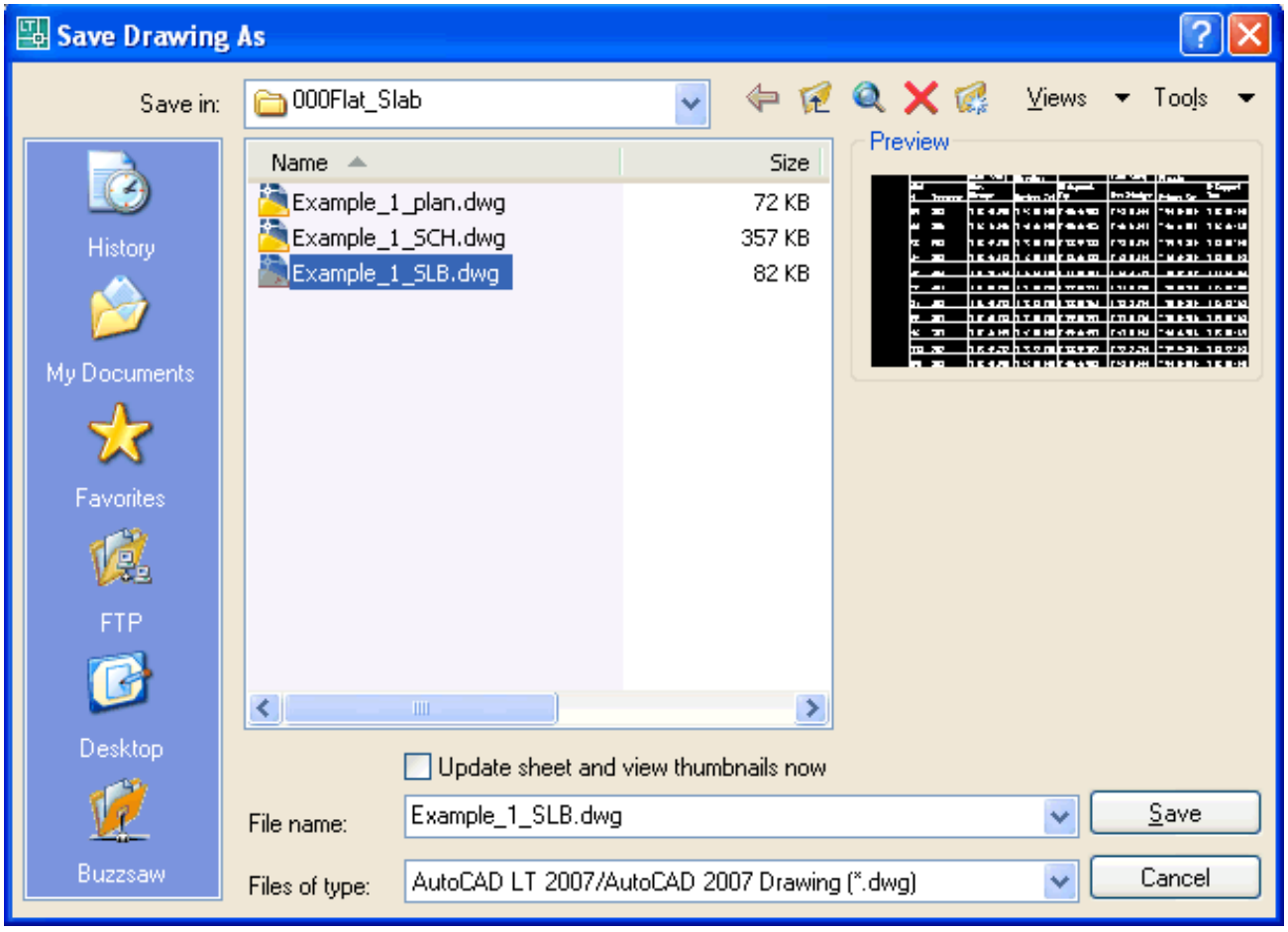
➤ **Another dialogue box appears . Click on OK.**



Now specify an Insertion Point, after which the Slab Schedule will be displayed in the form of AutoCAD drawing. Following is a part display.

SLAB REINFORCEMENT SCHEDULE							
		Steel Along Shorter Direction			Steel Along Longer Direction		
Slab #	Thickness	Btm Straight	Bottom Cut	@ Support Top	Btm Straight	Bottom Cut	@ Support Top
S1	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S2	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S3	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S4	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S5	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S6	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S7	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S8	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S9	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S10	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S11	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150
S12	360	T 10 @ 210	T 10 @ 210	T 12 @ 150	T 10 @ 210	T 10 @ 210	T 12 @ 150

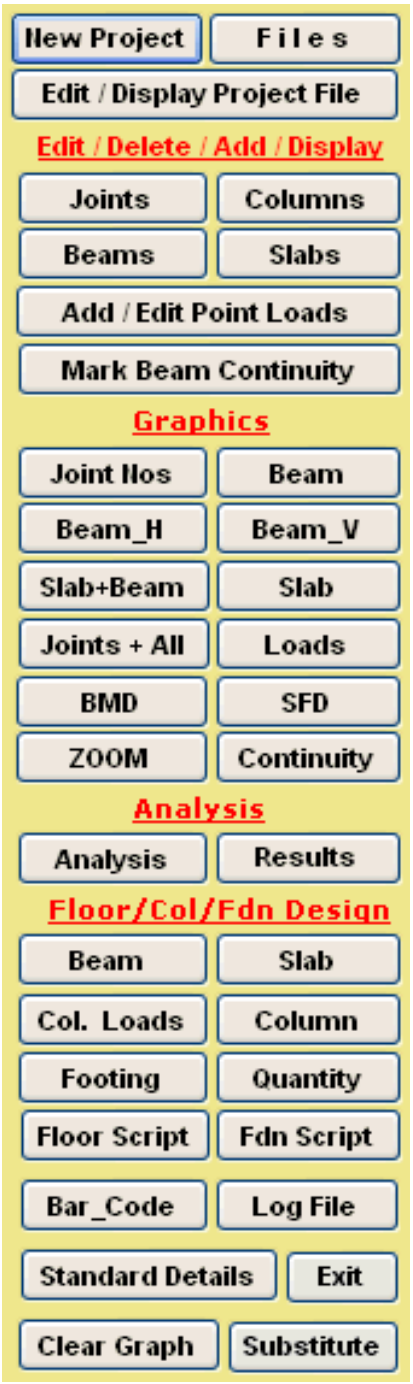
Finally, don't forget to save the above drawing in AutoCAD (i.e. dwg) format.



Let us Proceed to next Step.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 16 : Design of Building Columns

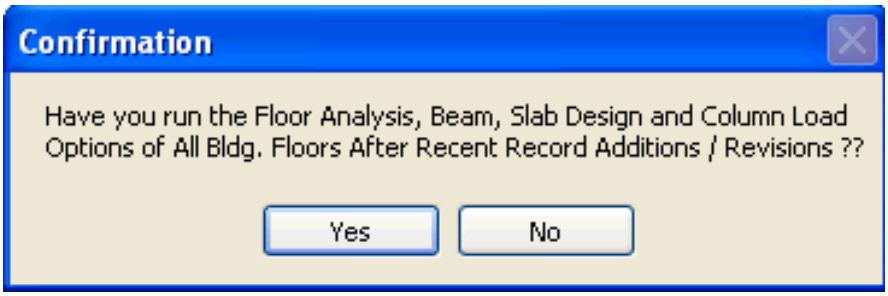


- **When Program starts, the Menu above is displayed. Under the Floor / Col / Fdn Design Heading following options are displayed.**

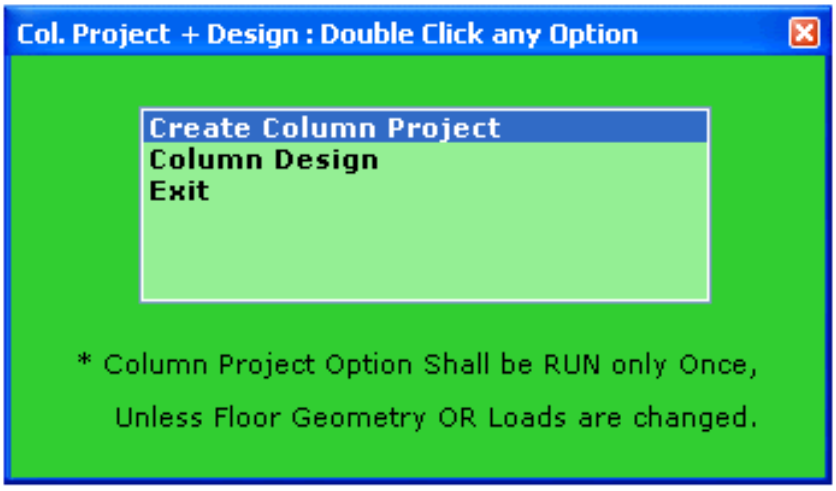
  - **Beam**
  - **Slab**
  - **Column Loads**
  - **Column Design**
  - **Footing Design**
  - **Quantity**
  - **Floor Script for AutoCAD Dwg.**
  - **Foundation Script for AutoCAD Dwg.**

  Now Click on " Column " Option.

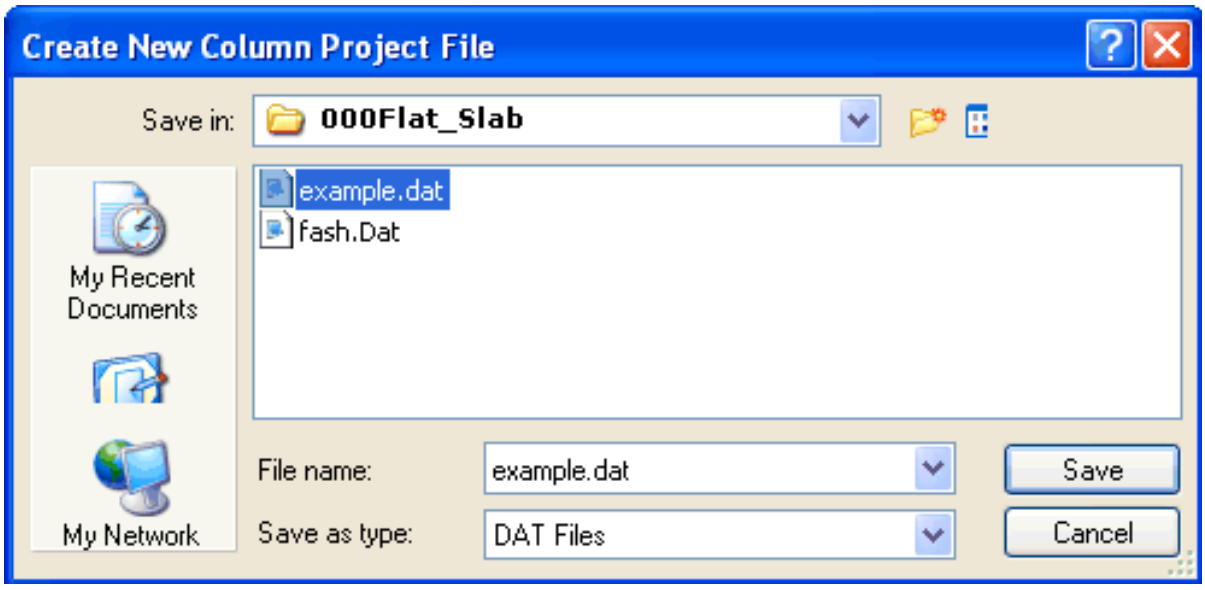
  Following Important Message is displayed.



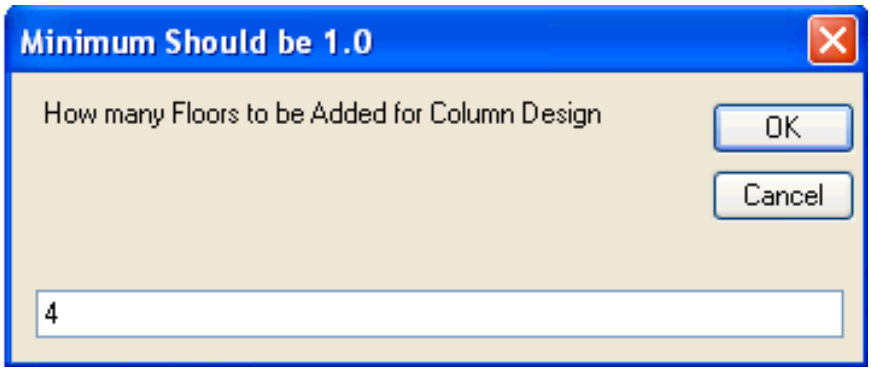
- **In order to Design all the Columns of Building, we must first RUN the Analysis, Beam, Slab Design and Column Loads of individual Floors. If Columns are having Moments than they should be incorporated using Edit / Delete / Add / Display option (Refer Step 5) before performing floor analysis. Also any changes to column parameters should be carried out at this stage, for example I have changed Steel Face to "N" for all columns (Reinforcement distributed on all four faces).**
  If Yes is clicked, following Green dialogue window is displayed.



- **Now Click on Create Column Project. Following is displayed.**



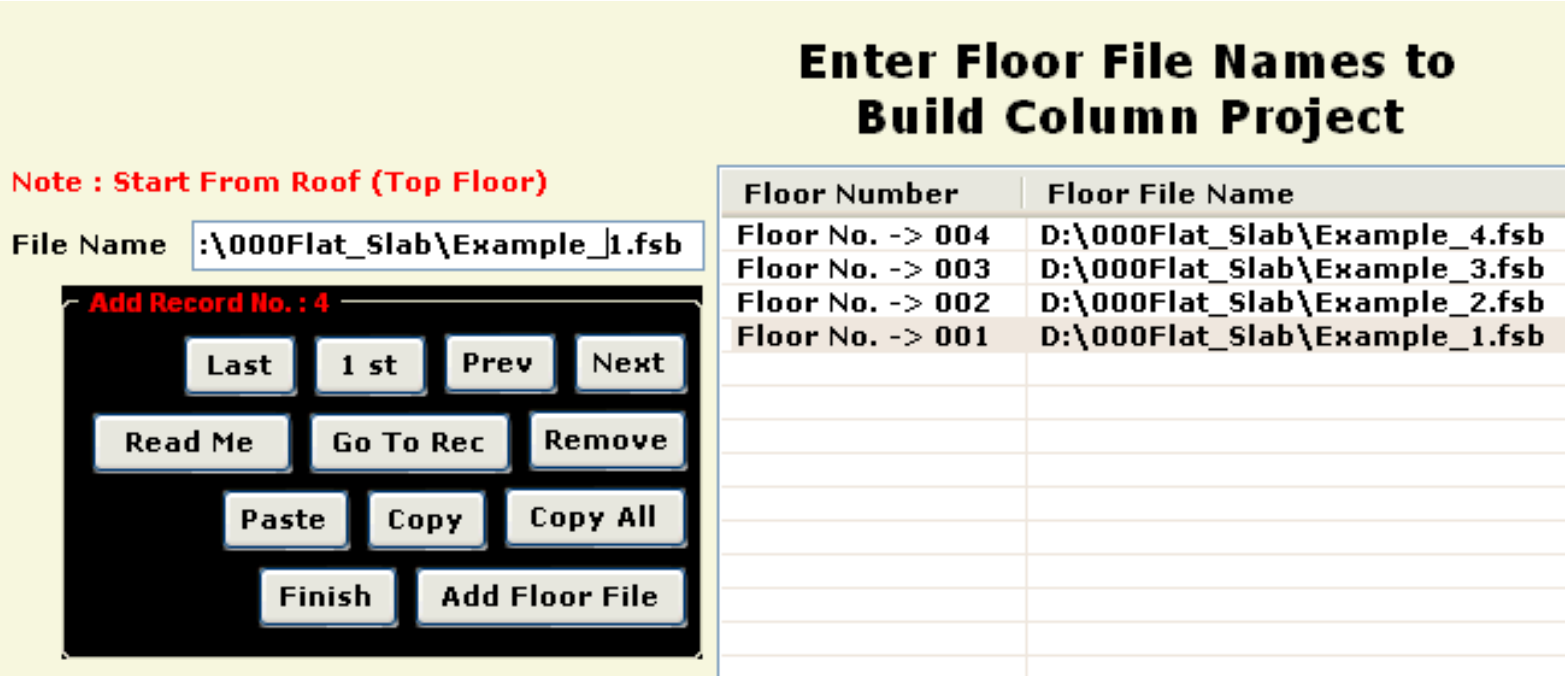
- **Give a suitable name to Column Project File for Design. I have given "EXAMPLE" as the file name. Note that column project file name is with extension ".DAT", while floor file extensions are with ".FSB". In order to remove any confusion, a user should give different file name to Column project and respective Floor Files. Click save button, following window will appear.**



- **No. of Floors can be no. of storey of multi-story building OR no. of Storeys + 1, to account for ground floor. I have indicated no. of floors as four (4).**

A typical floor can be converted in to G. F. by deleting all slabs (Refer Step # 6) and re-analyzing the floor. Thus all floor beams are Plinth Beams having only Masonry Wall Load. However designer has to use our RCF Software, in Flat Slab design this cannot be done.

Click OK button. A new window appears.



- **In order to Build Column Project, I have indicated 4 Floor files, corresponding to 4 floors. Actually Example_4, Example_3, and Example_2 are typical floors. I have created, analyzed and designed only one floor (Example_4) and copied this floor file to Example_3, Example_2 and Example_1.**
  Click Read Me button following relevant info is displayed.

  • This option Develops Column Project File.
  • User has to specify File name for each floor of the Building. Use Add Floor File Button.
  • File name for each floor shall be different.
  • File name for floors cannot be repeated.
  • The program will add column loads of respective floors for each column.
  • This option is to be Run after Analysis / Design and Column Load option of each floor (File) has been performed.
  • Start from the TOP floor.
  • Floors of the Same Building is to be Added.
  • Same Floor File can be given repeatedly in case of Typical floors Using Copy All Button, and Later Edited to make different file name.
  • All Columns on the Floors should be same in Numbers & Location.
  • Column Designation on all floors should be Same.
  • Column Addition or Deletion between floors is not Permitted.
  • Floors will always start from Floor no. -> 001.
  • This Floor no. -> 001 could be G. F. of Bldg. having only Plinth Beams + Walls, but no Slab.
  Use our RCF Software for this.

  There is no restriction on Number of Floors, except your computer's memory.
  Click Finish Button to Proceed. Following window will appear displaying Column Cumulative Loads.

DISPLAYING COLUMN LOADS OF BUILDING

Column Number	Cummulative Loads
C1 : Floor No. -> 004	28.947
C1 : Floor No. -> 003	57.894
C1 : Floor No. -> 002	86.841
C1 : Floor No. -> 001	115.788
C2 : Floor No. -> 004	43.975
C2 : Floor No. -> 003	87.95
C2 : Floor No. -> 002	131.925
C2 : Floor No. -> 001	175.9
C3 : Floor No. -> 004	43.976
C3 : Floor No. -> 003	87.952
C3 : Floor No. -> 002	131.928
C3 : Floor No. -> 001	175.903
C4 : Floor No. -> 004	28.947
C4 : Floor No. -> 003	57.894
C4 : Floor No. -> 002	86.841
C4 : Floor No. -> 001	115.788
C5 : Floor No. -> 004	34.881
C5 : Floor No. -> 003	69.762
C5 : Floor No. -> 002	104.643
C5 : Floor No. -> 001	139.524
C6 : Floor No. -> 004	107.343
C6 : Floor No. -> 003	214.686
C6 : Floor No. -> 002	322.029
C6 : Floor No. -> 001	429.371
C7 : Floor No. -> 004	79.006
C7 : Floor No. -> 003	158.012
C7 : Floor No. -> 002	237.017
C7 : Floor No. -> 001	316.023
C8 : Floor No. -> 004	51.934
C8 : Floor No. -> 003	103.868
C8 : Floor No. -> 002	155.802
C8 : Floor No. -> 001	207.736

- **Now Click Column Design Option from the Green Color menu, Column Schedule is displayed as under. Note that Column design is fully automatic, Input from the User is not required.**

COLUMN REINFORCEMENT SCHEDULE

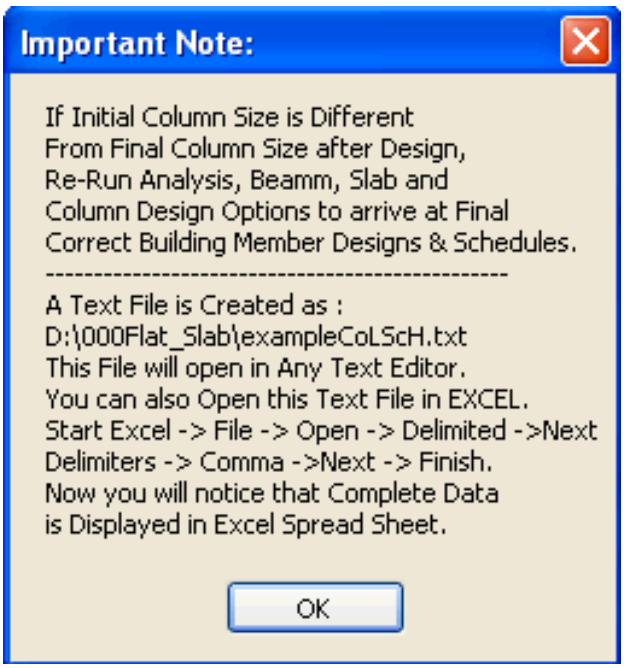
Description	X-X Dim	Y-Y Dim	Reinforcement	Links
C1 : Floor No. -> 004	900	450	4 T 16 + 8 T 20	d 6 @ 255 - 3 Nos
C1 : Floor No. -> 003	850	450	4 T 16 + 8 T 20	d 6 @ 255 - 3 Nos
C1 : Floor No. -> 002	850	450	4 T 16 + 8 T 20	d 6 @ 255 - 3 Nos
C1 : Floor No. -> 001	650	450	12 T 16	d 6 @ 255 - 3 Nos
C2 : Floor No. -> 004	700	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C2 : Floor No. -> 003	600	450	12 T 16	d 6 @ 255 - 3 Nos
C2 : Floor No. -> 002	600	450	12 T 16	d 6 @ 255 - 3 Nos
C2 : Floor No. -> 001	650	450	12 T 16	d 6 @ 255 - 3 Nos
C3 : Floor No. -> 004	700	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C3 : Floor No. -> 003	600	450	12 T 16	d 6 @ 255 - 3 Nos
C3 : Floor No. -> 002	600	450	12 T 16	d 6 @ 255 - 3 Nos
C3 : Floor No. -> 001	650	450	12 T 16	d 6 @ 255 - 3 Nos
C4 : Floor No. -> 004	900	450	4 T 16 + 8 T 20	d 6 @ 255 - 3 Nos
C4 : Floor No. -> 003	800	450	4 T 12 + 8 T 20	d 6 @ 190 - 3 Nos
C4 : Floor No. -> 002	800	450	4 T 12 + 8 T 20	d 6 @ 190 - 3 Nos
C4 : Floor No. -> 001	650	450	12 T 16	d 6 @ 255 - 3 Nos
C5 : Floor No. -> 004	800	450	4 T 12 + 8 T 20	d 6 @ 190 - 3 Nos
C5 : Floor No. -> 003	700	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C5 : Floor No. -> 002	700	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C5 : Floor No. -> 001	600	450	12 T 16	d 6 @ 255 - 3 Nos
C6 : Floor No. -> 004	900	450	4 T 16 + 8 T 20	d 6 @ 255 - 3 Nos
C6 : Floor No. -> 003	750	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C6 : Floor No. -> 002	750	450	4 T 16 + 4 T 25	T 8 @ 255 - 2 Nos
C6 : Floor No. -> 001	950	450	12 T 20	d 6 @ 285 - 3 Nos
C7 : Floor No. -> 004	800	450	4 T 12 + 8 T 20	d 6 @ 190 - 3 Nos

- **Click Read Me Button, following info + design philosophy is described.**

1. Column Size in MM.
2. Max. Size = 600 x 1800 MM.
3. T Indicates Tor Steel.
4. d Indicates Mild Steel.
5. @ means Spacing of Bars in MM C/C.
6. Nos Means Links per Set."
7. ERROR : Indicates Design Error,
8. Refer LOG File for Details.
9. Always Run Analysis, Beam and
10. Slab Design Options, before running
11. Column Design to avoid ERRORS.
12. Refer Std. Column Details for Reinforcement Details.
13. Column design is based on keeping the steel %
14. fixed at 0.80 %, for a given column section.
15. If the section is inadequate, longer dimension
16. will increase by 50 up to 1000 MM. If still the sec.
17. is UnSafe, shorter dim. will increase up to 600 MM.
18. After reaching 600 x 1000 MM section, if still col.
19. sec. is unsafe than longer dim. will increase upto
20. 1800 MM. If still sec. is unsafe then steel % will
21. increase by 0.1 upto 3.0 %, after reaching this limit
22. Error Message will be Flashed.

23. If a user wants to keep the Column size fixed then
24. he/she should give initial steel % appropriately high.

Now click OK button to proceed.



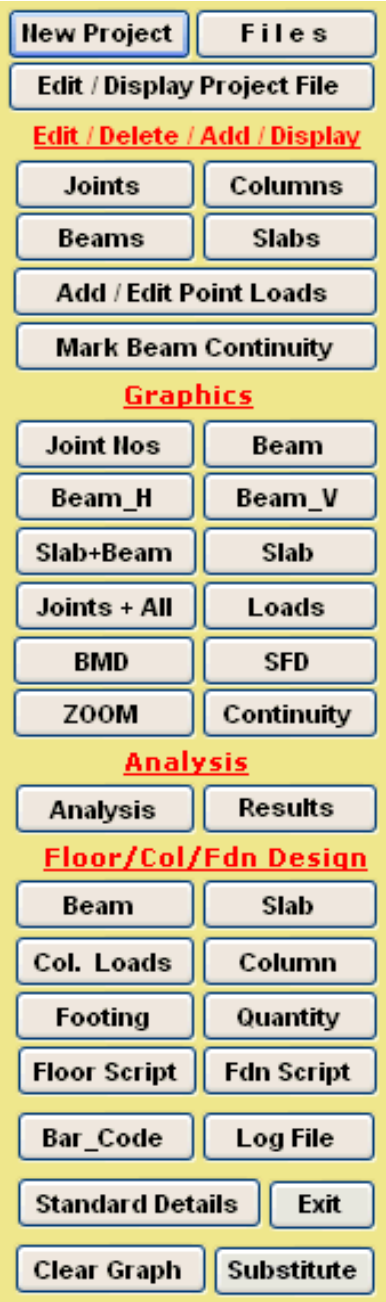
- **The above Message regarding Re-Analyzing, Designing & Column Load calculation option is very important for arriving at Correct Floor Design. The other Message is regarding exporting Column Schedule file to EXCEL, which will be used for Re-Exporting file to AutoCAD. Click OK Button.**

- **The above message describes creation of column schedule in AutoCAD. The Steps required to create Column Schedule in AutoCAD is similar to that of Beam / Slab, Refer Step No. 14 and 15 for details. Now we have come to the end of Step # 16. In the next step we will Design Isolated Footings.**

STEP NO. 16 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 17 : Design of Isolated Footings

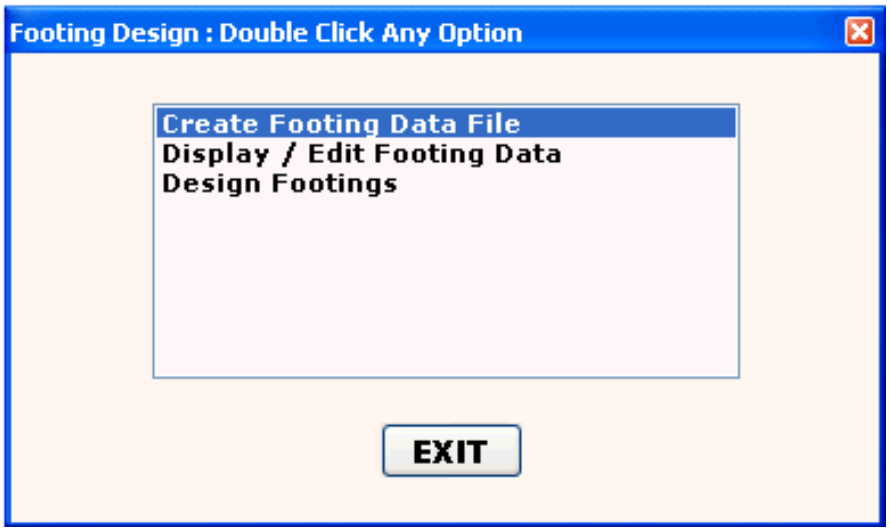


- **When Program starts, the Menu above is displayed. Under the Floor/Col/Fdn Design Heading following options are displayed.**

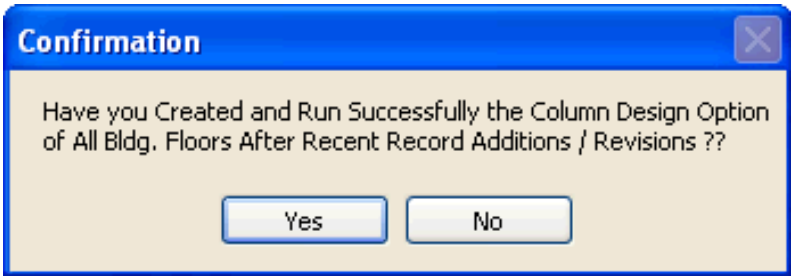
  - **Beam**
  - **Slab**
  - **Column Loads**
  - **Column Design**
  - **Footing Design**
  - **Quantity**
  - **Floor Script for AutoCAD Dwg.**
  - **Foundation Script for AutoCAD Dwg.**

Now Click on " Footing " Option.

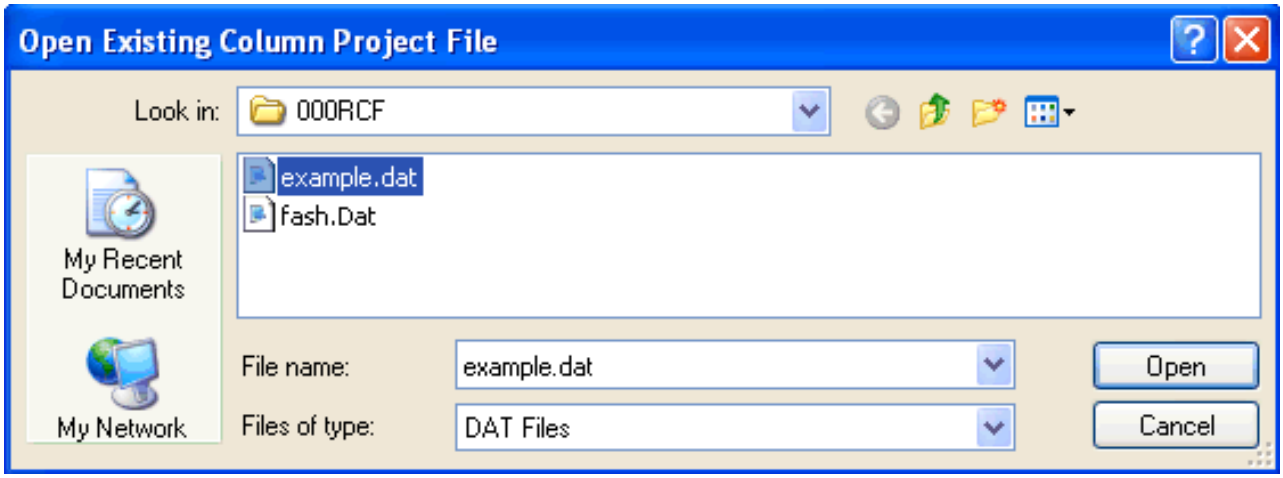
Following Foundation Menu is displayed.



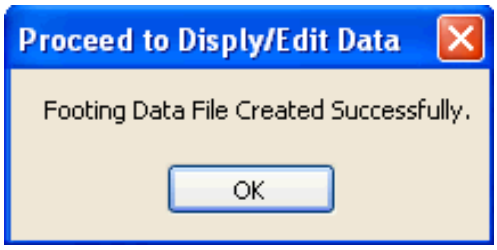
- **Double Click the 1st Option, " Create Footing Data File ".**
  Following Confirmation Window is displayed.



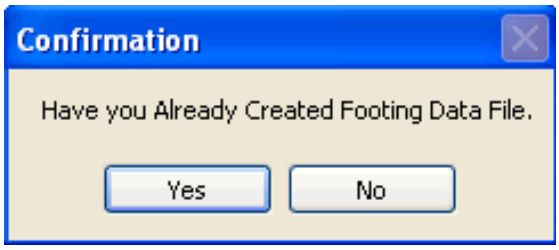
- **In order to Design Foundation of Building, we must first RUN the Column Design Option, which calculates cumulative Floor Loads for Each Column, apart from designing them. The Cumulative Load of 1st Floor Columns are taken as Compressive Load on foundation. Tensile Load or Bending Moments from either direction is not allowed. Isolated Footings could be Tapered or Uniform. Usually Tapered Footings are 40 % cheaper than Uniform footings, however quality of construction suffers due to Taper Shape. A offset of 50 - 100 MM is provided when Footing's taper meets column.**
  If Yes is clicked, following dialogue window is displayed.



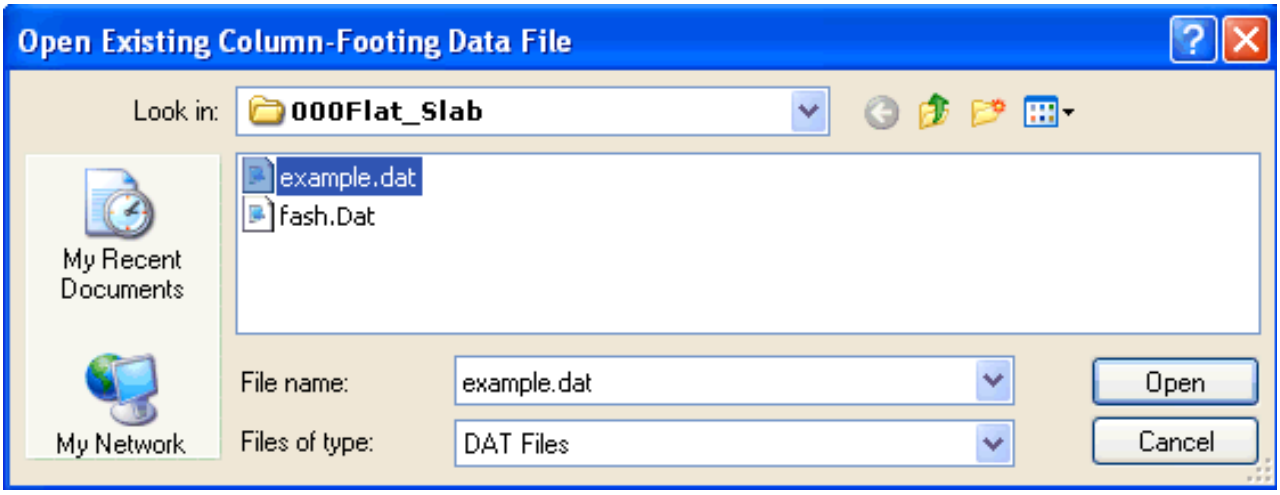
- **Open the existing Column " Example.Dat " File. Following message will appear.**



- **Click the OK Button. Now Proceed to Display / Edit Footing Data from Foundation Menu. Double Click this option. Following Confirmation message will open up.**



- **Click YES, if it is true. Following dialogue window will appear.**



- **Open the Existing Column-Footing Data File. Following table is displayed.**

DISPLAY / EDIT / FOOTING INPUT DATA

Col. #	Load	Col. X-X Dim	Col. Y-Y Dim	Ftg X-X Dim	Ftg Y-Y Dim	Type	Edge Thk
C1	289.638	800	450	4.02	3.67	Uniform	830
C2	439.75	950	450	5	4.5	Uniform	1020
C3	439.759	950	450	5	4.5	Uniform	1020
C4	289.638	800	450	4.02	3.67	Uniform	830
C5	348.81	850	450	4.42	4.02	Uniform	920
C6	1073.4...	1600	600	7.9	6.9	Uniform	1565
C7	790.058	1200	600	6.65	6.05	Uniform	1360
C8	519.338	1000	500	5.4	4.9	Uniform	1110
C9	296.659	650	450	4	3.8	Uniform	860
C10	301.039	650	450	4.02	3.82	Uniform	865
C11	801.589	1250	600	6.72	6.07	Uniform	1360
C12	476.849	950	450	5.2	4.7	Uniform	1075
C13	488.88	950	450	5.25	4.75	Uniform	1080
C14	756.669	1200	600	6.52	5.92	Uniform	1330
C15	513.018	1000	450	5.4	4.85	Uniform	1110
C16	280.65	650	450	3.9	3.7	Uniform	835
C17	228.82	450	450	3.42	3.42	Uniform	765
C18	428.75	850	450	4.87	4.47	Uniform	1025
C19	387.98	750	450	4.6	4.3	Uniform	975
C20	436.539	900	450	4.95	4.5	Uniform	1030
C21	260.807	550	450	3.7	3.6	Uniform	815
C22	301.029	650	450	4.02	3.82	Uniform	865

- **It may be noted from above table that you can edit Load on Footing, Column (Pedestal) size, Footing size, Edge thickness and type of footing (Uniform or Tapered). The isolated footing size is arrived by the program after considering applied Column Load, SBC and foundation depth.**

Click Read Me Button, following info + design philosophy is described.

1. All Footings Correspond to respective Column Nos.
2. Column Loads in Tons.
3. Column X-X Dim -> Col. dimension along x-x axis.
4. Column Y-Y Dim -> Col. dimension along y-y axis.
5. Footing X-X Dim -> Footing dimension along x-x axis.
6. Footing Y-Y Dim -> Footing dimension along y-y axis.
7. Minimum Footing/Edge thickness shall not be < 150 MM.
8. Copy All Edge Thickness -> Will copy the selected edge
9. thickness to all column footings.
10. Click on All Uniform Button will make
11. all footing type as uniform.
12. Click on All Tapered Button will make
13. all footing type as tapered.
14. A user can Increase but not Decrease Column
15. Loads, Column Size & Footing Size.
16. Flat Slab Software will not design Footings Under Tension and Moments.
17. Isolated Footings under Compression will be designed.
18. While performing Frame Analysis of Bldg. A user
19. Shall make all base supports as hinged.
20. Refer our 2D Frame Analysis software or
21. Any other 2D / 3D Frame Analysis Software.

Now click Design Footings Option button to proceed. A user will be asked to confirm that

he/she has created & Edited Footing Data File. Click Ok and again select & Open "Example" file. Following Foundation Schedule will be displayed.

SCHEDULE OF FOUNDATION

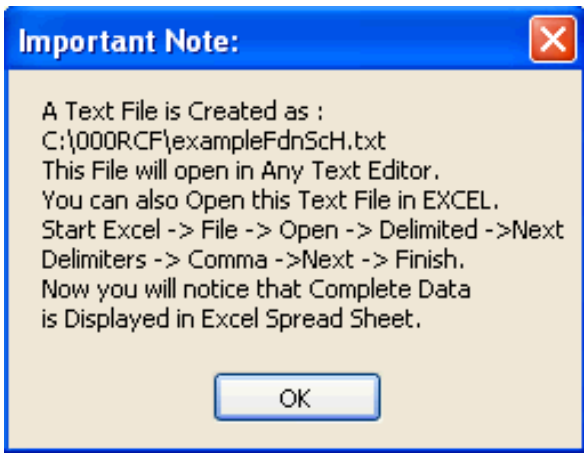
Col. #	Col. X-X	Col. Y-Y	Ftg. X-X	Ftg Y-Y	Thickness	Edge Thk	Steel X-X	Steel Y-Y
C1	800	450	4.02	3.67	830	830	Tor 16 @ 140 c/c	Tor 16 @ 140 c/c
C2	950	450	5	4.5	1020	1020	Tor 16 @ 110 c/c	Tor 16 @ 110 c/c
C3	950	450	5	4.5	1020	1020	Tor 16 @ 110 c/c	Tor 16 @ 110 c/c
C4	800	450	4.02	3.67	830	830	Tor 16 @ 140 c/c	Tor 16 @ 140 c/c
C5	850	450	4.42	4.02	920	920	Tor 16 @ 130 c/c	Tor 16 @ 125 c/c
C6	1600	600	7.9	6.9	1565	1565	Tor 20 @ 110 c/c	Tor 20 @ 110 c/c
C7	1200	600	6.65	6.05	1360	1360	Tor 20 @ 130 c/c	Tor 20 @ 130 c/c
C8	1000	500	5.4	4.9	1110	1110	Tor 16 @ 100 c/c	Tor 16 @ 100 c/c
C9	650	450	4	3.8	860	860	Tor 16 @ 135 c/c	Tor 16 @ 135 c/c
C10	650	450	4.02	3.82	865	865	Tor 16 @ 135 c/c	Tor 16 @ 135 c/c
C11	1250	600	6.72	6.07	1360	1360	Tor 20 @ 130 c/c	Tor 20 @ 130 c/c
C12	950	450	5.2	4.7	1075	1075	Tor 16 @ 105 c/c	Tor 16 @ 105 c/c
C13	950	450	5.25	4.75	1080	1080	Tor 16 @ 105 c/c	Tor 16 @ 105 c/c
C14	1200	600	6.52	5.92	1330	1330	Tor 20 @ 135 c/c	Tor 20 @ 130 c/c
C15	1000	450	5.4	4.85	1110	1110	Tor 16 @ 105 c/c	Tor 16 @ 100 c/c
C16	650	450	3.9	3.7	835	835	Tor 16 @ 140 c/c	Tor 16 @ 140 c/c
C17	450	450	3.42	3.42	765	765	Tor 16 @ 150 c/c	Tor 16 @ 150 c/c
C18	850	450	4.87	4.47	1025	1025	Tor 16 @ 115 c/c	Tor 16 @ 110 c/c
C19	750	450	4.6	4.3	975	975	Tor 16 @ 115 c/c	Tor 16 @ 115 c/c
C20	900	450	4.95	4.5	1030	1030	Tor 16 @ 110 c/c	Tor 16 @ 110 c/c
C21	550	450	3.7	3.6	815	815	Tor 16 @ 145 c/c	Tor 16 @ 145 c/c
C22	650	450	4.02	3.82	865	865	Tor 16 @ 135 c/c	Tor 16 @ 135 c/c
C23	1250	600	6.75	6.1	1375	1375	Tor 20 @ 130 c/c	Tor 20 @ 130 c/c
C24	1000	450	5.37	4.82	1110	1110	Tor 16 @ 105 c/c	Tor 16 @ 105 c/c
C25	1000	450	5.4	4.85	1110	1110	Tor 16 @ 100 c/c	Tor 16 @ 100 c/c

- Click Read Me Button, following info is described.

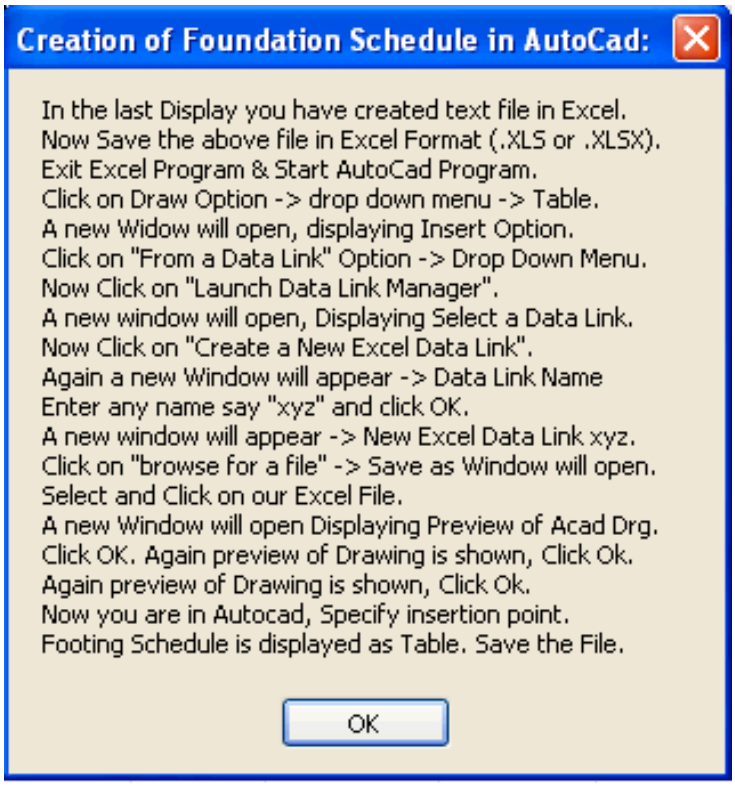
1. Steel X-X -> Reinforcement along X-X Direction.
2. Steel Y-Y -> Reinforcement along Y-Y Direction.
3. Effective Cover is taken as 60 mm.
4. PCC of 50 MM below each Footing is Assumed.
5. Fy = 415 : Load factor = 1.5
6. For design of foundation under tension & bending,
7. refer our SUPER CIVIL CD software.
8. Design will not check overlapping of footings,
9. It has to be checked manually.
10. The 1st Floor (G. F.) Concrete Grade and size of
11. columns will be taken for design of footings.
12. Spacing of Reinforcement Exceeding 1000 mm will be
13. restricted to 1000 mm. Spacing < 100 mm, will
14. not be allowed, instead Bar diameter is increased.
15. Bar diameter exceeding 25 mm is will not be allowed,
16. Error message will be displayed. Refer LOG File.
17. Hence Spacing is restricted to above 100 MM
18. and Below 1000 MM. Isolated Footing Pressure exceeding
19. SBC will not be allowed.
20. Min. steel = 0.12 % in each direction.
21. For Tapered Footing Average thickness is taken for

22. calculation of minimum steel.
23. For Uniform Footing Edge thickness = Total Thickness.

Click OK Button to Proceed.



- **The other Message is regarding exporting Footing Schedule file to EXCEL, which will be used for Re-Exporting file to AutoCAD. Click OK Button.**

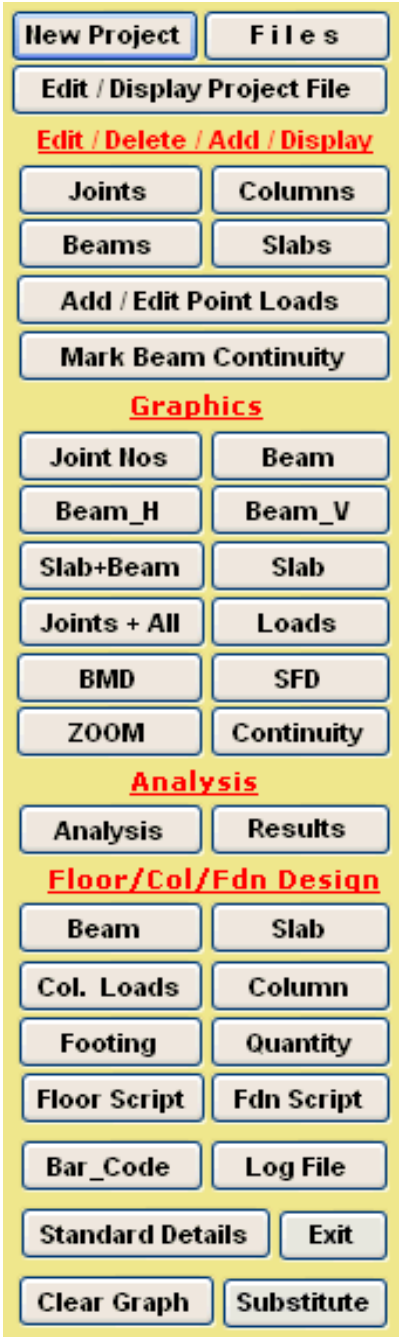


- **The above message describes creation of Foundation Schedule in AutoCAD. The Steps required to create Foundation Schedule in AutoCAD is similar to that of Beam / Slab, Refer Step No. 14 and 15 for details. Now we have come to the end of Step # 17.**

STEP NO. 17 IS OVER.

LEARN FLAT SLAB STEP BY STEP

STEP NO. 18 : Column, Footing and Project Quantities And Cost + Substitution of Steel

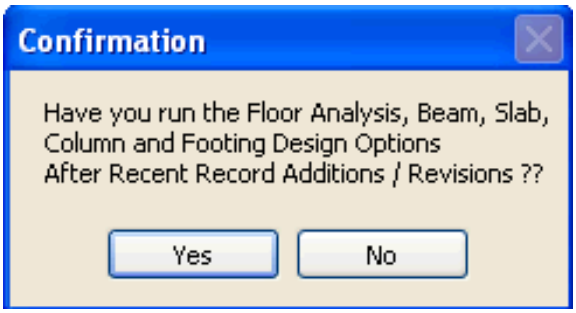


- **When Program starts, the Menu above is displayed. Under the Floor / Col / Fdn Design Heading following options are displayed.**

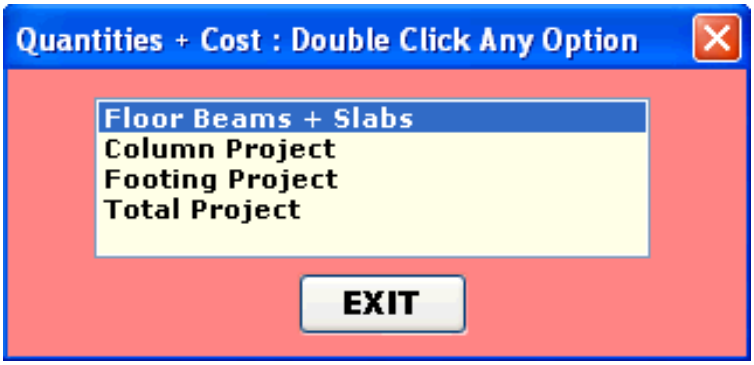
  - **Beam**
  - **Slab**
  - **Column Loads**
  - **Column Design**
  - **Footing Design**
  - **Quantity**
  - **Floor Script for AutoCAD Dwg.**
  - **Foundation Script for AutoCAD Dwg.**

  Now Click on " Quantity " Option.

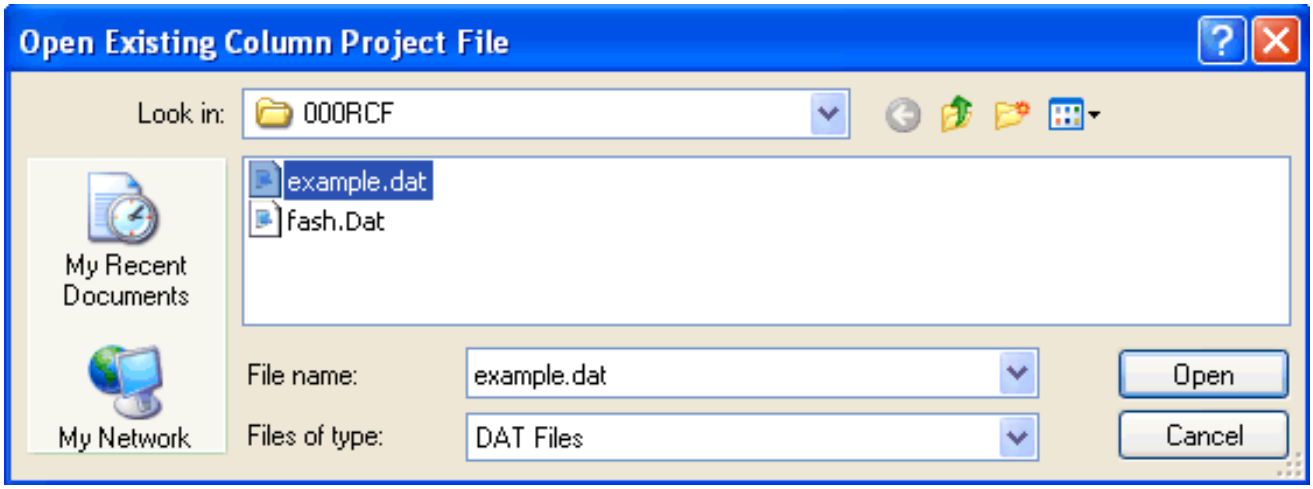
  Following Confirmation Message is displayed.



- **Unless All relevant Floors of the Building are Analyzed and Beam, Slabs, Columns, Foundation are Designed, Column Loads worked out, the Calculation of Quantities & Cost have no meaning. The Quantity Option is to be RUN last after all other things are completed. Click Yes if complied. Following ALL QTY menu is displayed.**



- **Note that we have already covered " Floor Beams + Slabs " in Step No. 11.**
  Now double click " Column Project " option. Following is displayed.



- **Open the existing Column " Example.Dat " File. Summary of Complete Building Column Quantities and Cost will be displayed as under.**

SUMMARY OF COLUMN QUANTITIES AND COST

Total Concrete in M35 Grade in M3 = 105.907
Total Reinforcement in Tons = 10.564
Total Plaster / Painting in M2 = 816.3
Total Cement in Bags = 1415
Total Aggregate in M3 = 84.725
Total Sand in M3 = 58.6888
Total Concrete Cost = 635442
Total Reinforcement Cost = 528200
Total Plaster Cost = 326520
Total Painting Cost = 81630
Total Column Cost = 1571792

SUMMARY OF REINFORCEMENTS IN KG

6 MM Dia :	1850.901
8 MM Dia :	368.245
10 MM Dia :	0
12 MM Dia :	1410.312
16 MM Dia :	4007.196
20 MM Dia :	1984.737
25 MM Dia :	942.824
32 MM Dia :	0

- **Click the OK Button, and Double Click Footing Project. Open the Existing Column-Footing " Example " file. Summary of Complete Building Isolated Footing Quantities and Cost will be displayed as under.**

SUMMARY OF FOUNDATION QUANTITIES AND COST

Total Concrete in M35 Grade in M3 = 856.862
Total Reinforcement in Tons = 23.844
Total Excavation and Re-Filling in M3 = 1365.417
Total Cement in Bags = 10454
Total Aggregate in M3 = 685.49
Total Sand in M3 = 342.745
Total Concrete Cost = 5141172
Total Reinforcement Cost = 1192200
Total Excavation and Re-Filling Cost = 204812.5
Total Foundation Cost = 6538185

SUMMARY OF REINFORCEMENTS IN KG

6 MM Dia :	0
8 MM Dia :	0
10 MM Dia :	0
12 MM Dia :	283.336
16 MM Dia :	12486.16
20 MM Dia :	11074.76
25 MM Dia :	0
32 MM Dia :	0

- **Click the OK Button, and Double Click Total Project. Confirm Compliance of Message shown and Open the Existing Column-Footing " Example " file. Summary of Complete Building Quantities and Cost (Floors + Columns + Isolated Footings) will be displayed as under.**

SUMMARY OF PROJECT QUANTITIES AND COST

Project # : 8912

Concrete Grade : M35

Total Concrete in M35 Grade in M3 = 1970.934
Total Concrete Cost = 1.18256E+07
Total Reinforcement in Tons = 140.895
Total Reinforcement Cost = 7044750
Total Masonry in M2 = 2613.796
Total Masonry Cost = 2221727
Total Plaster in M2 = 8843.892
Total Plaster Cost = 3537557
Total Painting in M2 = 8843.892
Total Painting Cost = 884389.2

REINFORCEMENT SUMMARY IN KG

6 MM Dia :	1850.902
8 MM Dia :	13572.14
10 MM Dia :	18919.46
12 MM Dia :	36865.73
16 MM Dia :	46631.36
20 MM Dia :	21486.07
25 MM Dia :	942.824
32 MM Dia :	0

Bldg. ID : Admin

Fy = 415

SBC in T/M2 : 20

Fdn. below GL in M = 1.8

No. of Floors = 4

Effective Cover - Beams = 25 MM
Effective Cover - Slabs = 20 MM
Effective Cover - Columns = 50 MM
Effective Cover - Foundation = 60 MM

Total Flooring in M2 = 2800
Total Flooring Cost = 2240000
Total Door / Window in M2 = 369.6
Total Door / Window Cost = 924000
Total Excavation+Refilling in M3 = 1365.417
Total Excavation+Refilling Cost = 204812.5
Total Cement Bags in Nos. = 26809
Total Sand in M3 = 1185.433
Total Aggragates in M3 = 1662.215
Total Project Cost = 28882836
Total Floor Area in M2 = 2800
Cost per M2 = 10315.3
Cost per sft = 959.562
Cement Bags per sft = 0.89
Reinforcement in Kg per sft = 4.68
Steel in Kg / M3 of Concrete = 71.486
Conc. Cost as % of Total = 40.943
Steel Cost as % of Total = 24.39
Masonry Cost as % of Total = 7.692

- **Note that above data describes Technical & Managerial parameters, essential for cost comparison.**
- **Now Click Substitute Button. This Program is for substitution Of Reinforcement Numbers,**
  Diameter & Spacing Of Bars and Stirrups. The Program is Self Explanatory.

This Completes Step # 18.

STEP NO. 18 IS OVER.

OTHER SOFTWARES:

SUPER CIVIL CD - Single Point Solution To Your Civil Engineering Needs

SUPER RATE ANALYSIS - Rate Analysis Of 1299 Nos. Of Civil Engineering Items

2D FRAME ANALYSIS - Discover The Beauty Of Structural Analysis

R C F - A Software for Analysis, Design, Estimation & Costing of RCC Floors

S S F - Analysis, Design, Estimation & Costing of Steel Buildings, revised as per IS 800 : 2007

Q T Y - Quantity Estimation & Cost, Project Control

SUPER REAL VALUATION - A Software For Immovable Properties

ROADS - Pavement Design & Rate Analysis Of Road Items

ROAD ESTIMATE - Quantity Estimation & Cost, Project Control For Road

ELECTRIC COST - Costing, Project Control & MDS For Electrical Projects

HVAC COST - Costing, Project Control & Design For HVAC Engineers

BILLING JI - A Database Management Software For General Billing

RA BILL - A Database Management Software For Item Rate Contract Billing

BUILDERS BILL - A Database Management Software for Billing of Lump sum Contracts

BID ANALYSIS - A Software For Technical & Commercial Tender Analysis

RAFT FOUNDATION - Analysis, Design, Estimation, Costing & Drawing of RCC Raft Foundation

STEEL 2007 - Limit State design of Steel as per IS 800 : 2007

SITE CONTROL - A Management Software for Resource Control At Site.

COMPOSITE - A Software for Analysis, Design, Costing & Drawing of Composite Floor Buildings

DESIGN & DRAWING CONTROL - A DBM Software for Control of Design & Drawing Manhours.

INSTA COST - A Software for Estimating Project Cost & Tender SOQ Instantly

FLAT RAFT - A Software for Analysis, Design, Estimation, Costing & Drawings of Rigid RCC Flat Rafts

OPTIMIZE BAR - A Software for Optimization of Reinforcements from Existing Bar Bending Schedule

OPTIMIZE STEEL - A Software for Optimization of Steel Sections from Existing Fabrication Drawing

AutoQty - A Software for Automatic Quantity & Cost Estimation from AutoCAD Drawings