LEARN FLAT RAFT

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

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LEARN FLAT RAFT

A Software for Analysis, Design, Estimation, Costing &
Drawing of RC Rigid Flat Raft Foundation

Introduction + Excerpts from IS 2950	INTRO & LIMITATION
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LEARN FLAT RAFT STEP BY STEP

INTRO & LIMITATIONS +
EXCERPTS FROM IS : 2950 - PART 1 - 1981

- **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 & AutoCAD Drawing of RCC Rigid Flat Raft Foundation.**

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

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

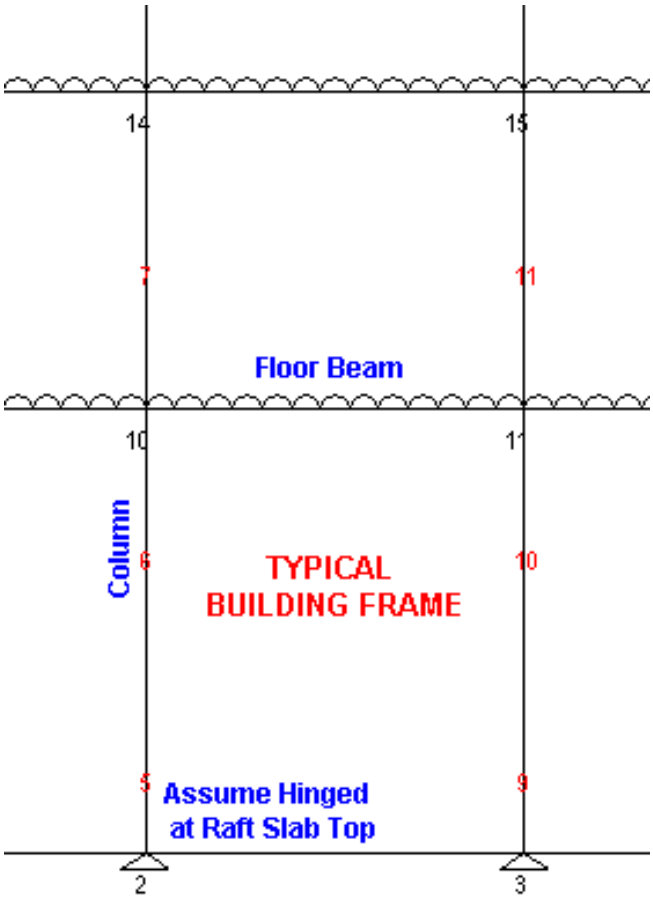
  Graphics option are available for display and tabular Format is available for Editing and Deleting Data.

  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 Foundation Plan, Joint, Beam, Column and Slab Numbers. A Joint represents a Column location or an intersection between 2 Raft 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 Raft Foundation Plan.
- **Cantilever Raft beams / Slabs cannot be analyzed.**
- **Beams / Columns / Slabs shall be along two mutually perpendicular axis (X and Y). Polygonal (Multi-sided) slabs cannot be analyzed.**



- **Analyze the Structure, assuming Raft Top (Column Base) as Hinged (Refer Graphics above). Hence there shall be no Moments on Raft Top.**

  Structure shall be Analyzed in Either direction. Hence User shall enter 3 Column Load Cases, i.e.

  • DL + LL

  • DL + LL + Wind / Seismic Load in Ton (From X-X Direction)

  • DL + LL + Wind / Seismic Load in Ton (From Y-Y Direction)

  End Column Reactions on Raft Beams (DL + LL + Wind or Seismic) are obtained by running 2-D or 3-D Frame Analysis programs separately.
  User may use our 2-D Frame Analysis software for calculation of End Reactions.

- **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.
  If more than One File is Created, Corresponding to Each of Load Cases, than Open Excel Sheet for Each File (Load Case). In Excel Sheet Editing, Deleting, Sorting, Printing & Merging of Data/Files/Excel Sheets is Extremely Easy. This way any no. of Load Cases can be Manipulated.

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

- **Intersecting Joints between two Beams (Main & Secondary) is assumed as Hinged. Hence no Moment transfer is envisaged.**
- **Connection between End Column and Beam is considered as Hinged. Hence no Moment transfer is envisaged between Column and Beam.**
- **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.**
- **Raft Beam & Slab Design is as per IS 456 - 2000. Refer IS 2950 : Part 1 - 1981 / 1965 For Rigid Raft Design / Relative Stiffness Factor.**
- **Hidden Beam Depth < 200 mm not permitted.**
- **Beam Width > 8000 mm not permitted.**
- **Links (Stirrups) < 75 MM for Hidden Beams is not permitted.**
- **Beam Reinforcement > 4 % not permitted.**
- **Age factor is considered as 1.15.**
- **For Durability aspect of Design, refer our " Super Civil CD " software.**
- **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.**
- **Minimum Computer RAM memory of 1 GB is recommended.**

- **Use Laser OR Ink Jet Printer.**
- **References:**

1. IS - 2950 - Part 1 - 1981.
2. BS - 8110 - 1997.
3. IS - 456- 2000 / 1978 / 1964.
4. SP 24 - 1983.
5. Advance Reinforced Concrete Design by P. C. Varghese.
6. Reinforced Concrete Designers Handbook by C. E. Reynolds.

IMPORTANT FEATURES OF FLAT RAFT

- **Hidden Beam marking in flat Raft Slab is different than the normal Raft 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 Raft (Middle Strips) Thickness.

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

4: Initial (Trial) Flat Raft Slab Thickness =
Max. Span of Beam or Slab in the Floor in MM ÷ 7.

5: Keep Column Size as Large as Possible, Larger the Column size lesser the Flat Raft 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: Concentrated loads Loads are not Permitted.

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: Raft Slab depth to be revised, if steel area exceeds 245 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 Raft Slab Design is meant for Vertical Loads only.

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

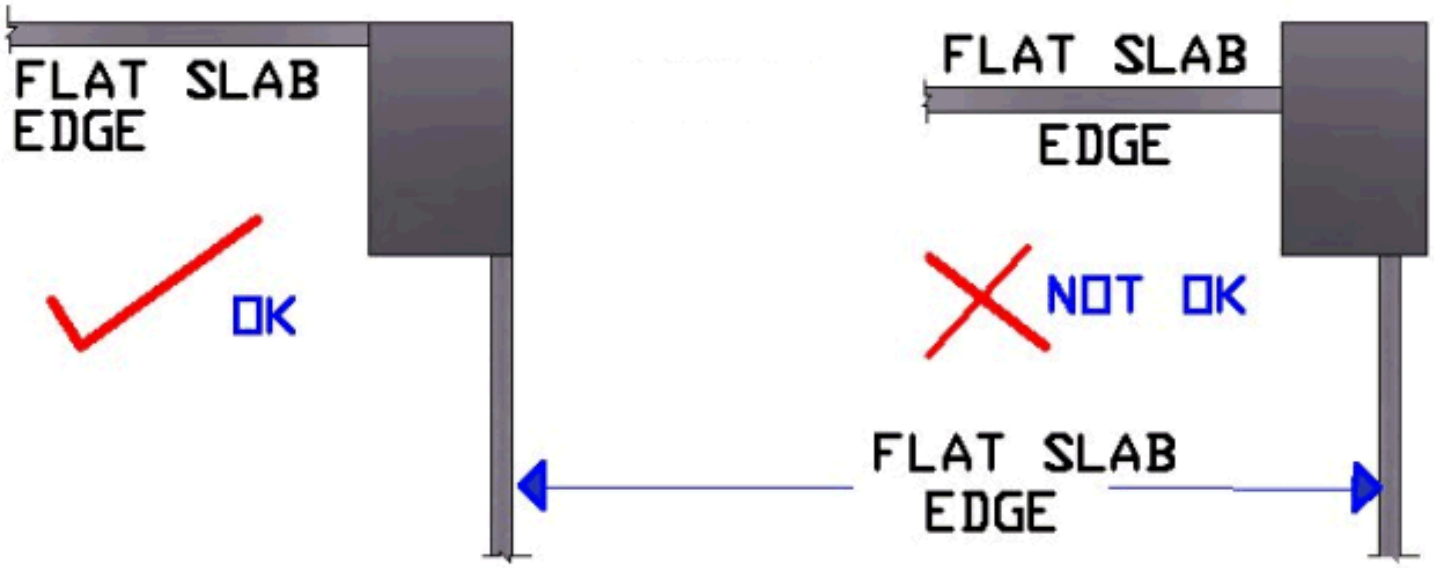
21: Convert Non Rectangular Column into Equivalent Square Column before Designing.

22: Min Reinforcement % in Either Direction in Hidden beam = 0.20 %.

23: Reinforcement Spacing Shall not Exceed 2 x Depth.

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

25: At Ends and Corners the Flat Raft Slab shall Extend up to or beyond Outer Edge of Column / Beam Else Flat Raft Slab will Fail in Punching.
Refer Details as under.
It is Preferable to extend at least 300 MM beyond Beam / Column face.



26: Large openings cannot be provided in Flat Raft Slab.

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

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

29. In case of Unsafe Flat Raft Slab / Hidden beam Design, any one or all of the following Corrective measures shall be adopted.

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

- **Export to PDF:**

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

EXCERPTS FROM IS : 2950 - PART 1 - 1981

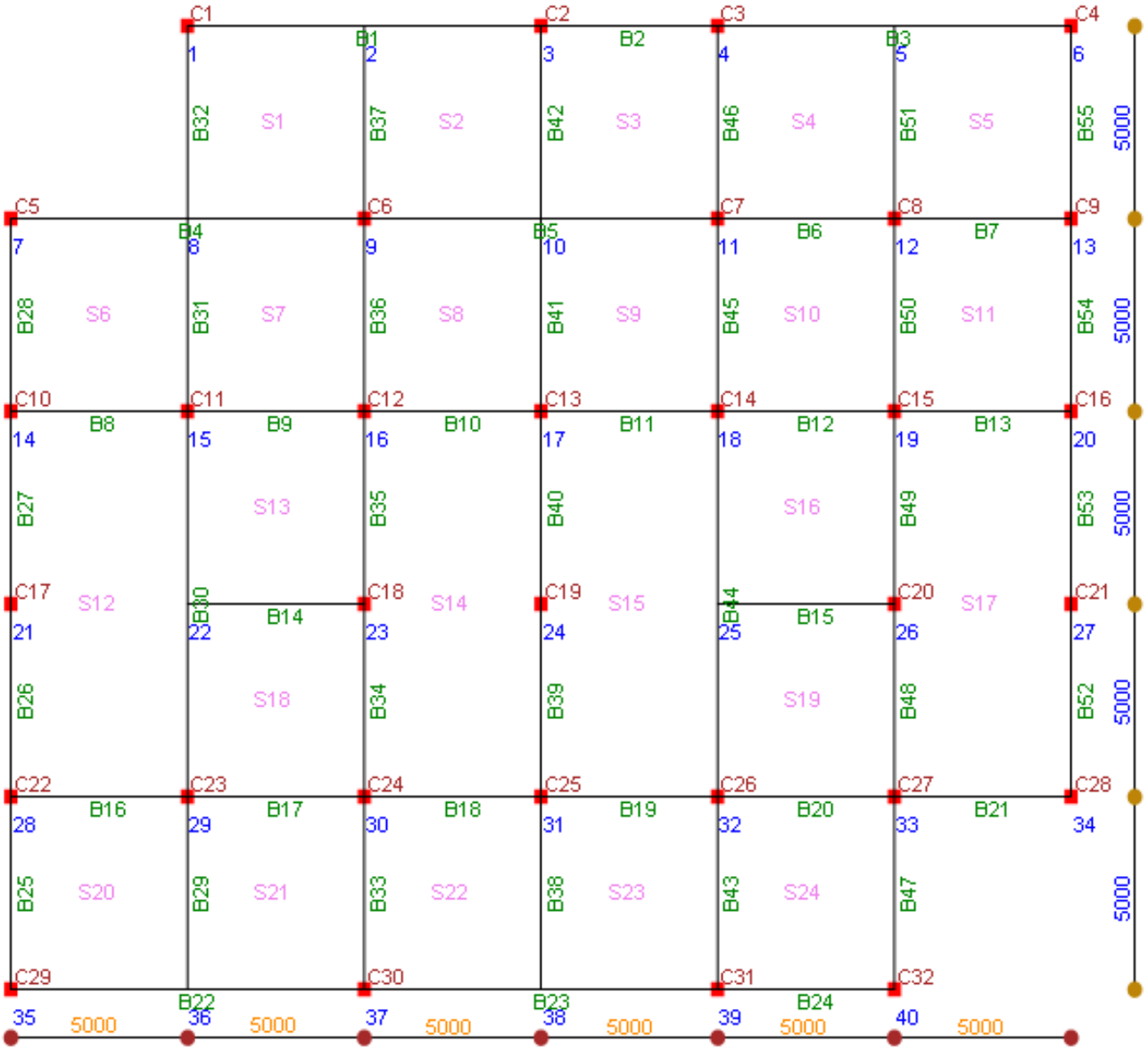
- IS : 2950 - Part 1 is CP for Design & Construction of Raft Foundation.
- In granular Soil, the SBC of Raft is generally very high, however for rafts placed at considerable depth (Like Basements) the punching mode of failure shall be investigated. The Influence of soil compressibility & related scale effects should be assessed.
  For Rafts on cohesive soils, the stability against deep seated failures & effect of long term settlement shall be taken in to consideration.
  The Depth of Raft Foundation shall not be Less than 1.0 M.
- Rigidity of Foundation tends to iron out uneven deformations & thereby modifies the contact pressure distribution. High order of rigidity is characterized by large moments & relative small uniform settlements. A rigid Foundation may also generate high secondary stresses in structural members. The effects of Rigidity shall be taken in to account in the analysis.
- Rigid foundation design is based on the assumption of linear distribution of contact pressure. The basic assumption of this method are :
  (a) The Foundation is rigid relative to the supporting soil & the compressible soil layer is relatively shallow.
  (b) The contact pressure is assumed as planner, such that the centroid of the contact pressure coincides with the line of action of the resultant force of all loads acting on the foundation.

  This method may be used when either of the following conditions is satisfied.
  (a) The structures behaves as rigid (due to combine action of the superstructure & the foundation) with a relative stiffness factor K > 0.50. (Refer Appendix C)
  (b) The Column spacing is less than 1.75 / Ã. (Refer Appendix C)

  The Raft is analyzed as a whole in of the two perpendicular direction & analysis is based on statics.

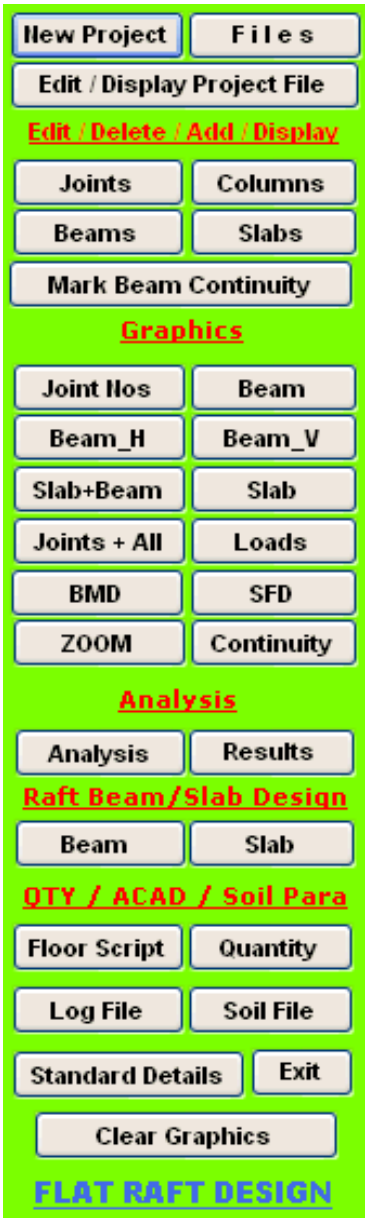
LEARN FLAT RAFT STEP BY STEP

STEP NO. 1 : New Project (File) Creation

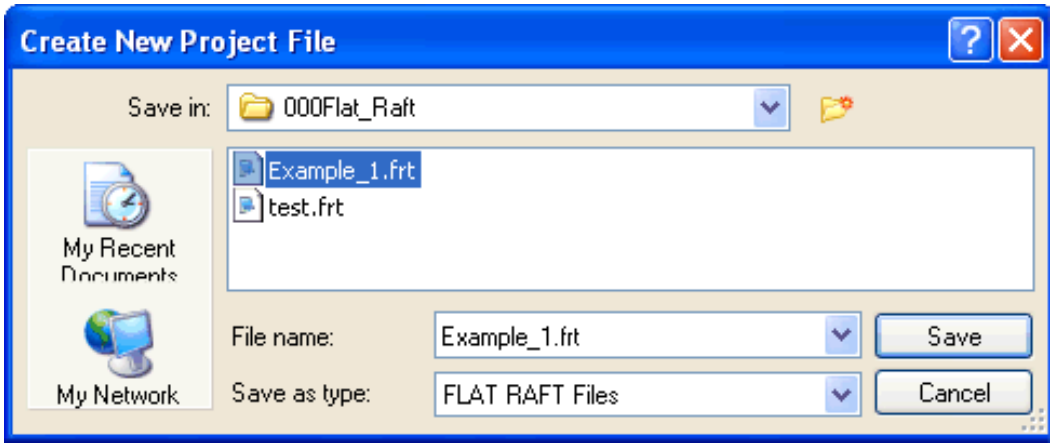


ACTUAL REQUIRED FLOOR PLAN

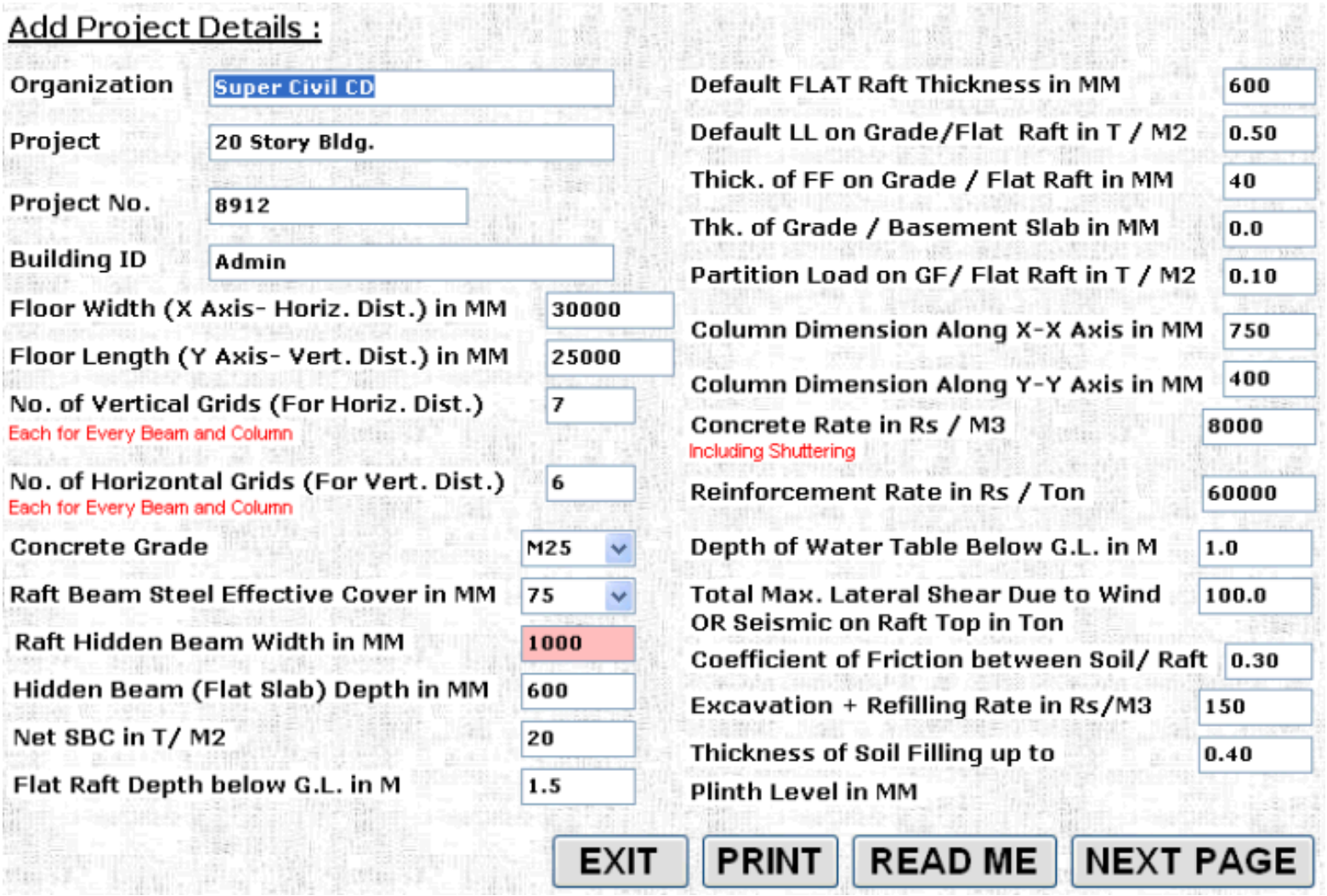
- **Refer the above Floor Drawing. Our Intention is to Analyze, Design, Estimate, Cost & Prepare BBS for the same. The above floor has 40 # of Joints, 32 # of Columns, 55 # of Beams and 24 # of Slabs.**
  Please go through the following steps carefully, so that we can achieve our object efficiently.



- **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.**

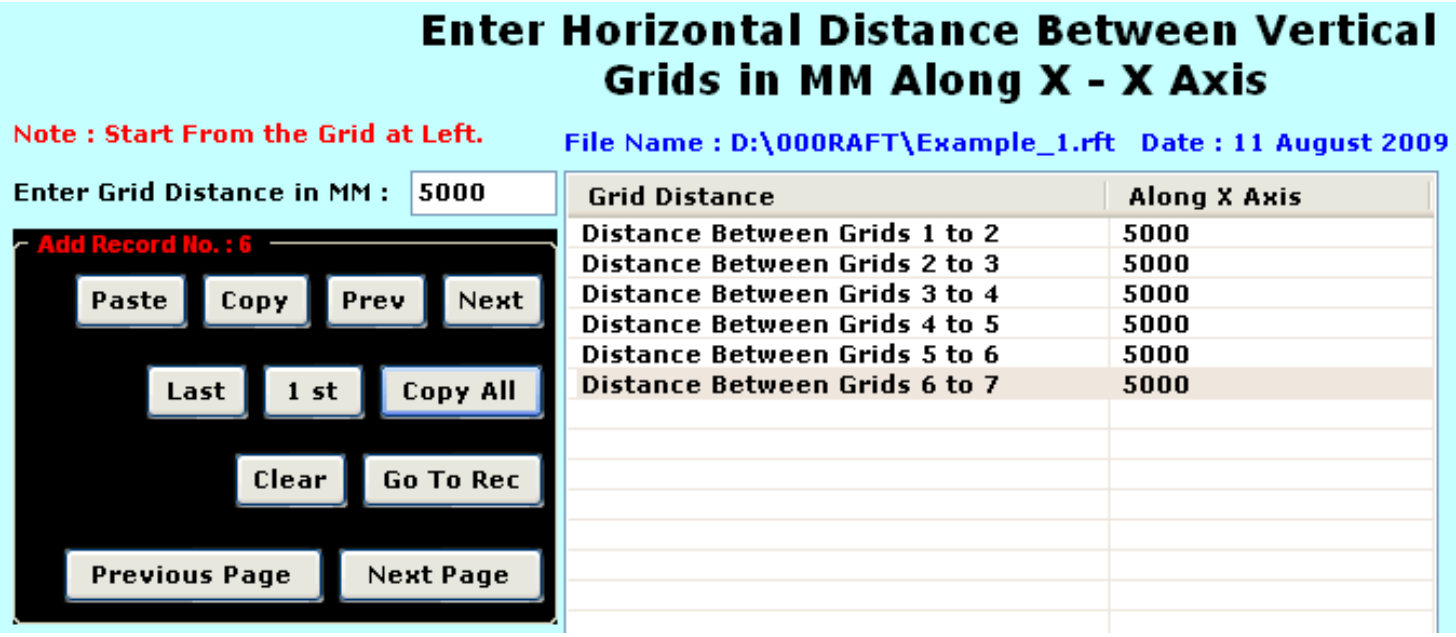


- **You must create a separate Folder / Directory to store your files.**
  I have created a Directory called " 000Flat_Raft " in C drive to store my Project files.
  Now go to this folder & give a file name to your project. I have given " Example_1 " as the name of my new project file. Click the save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



- **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 ".
  Please note that you can only change Building information, SBC, Foundation Depth and Material Rate 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 Raft 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.

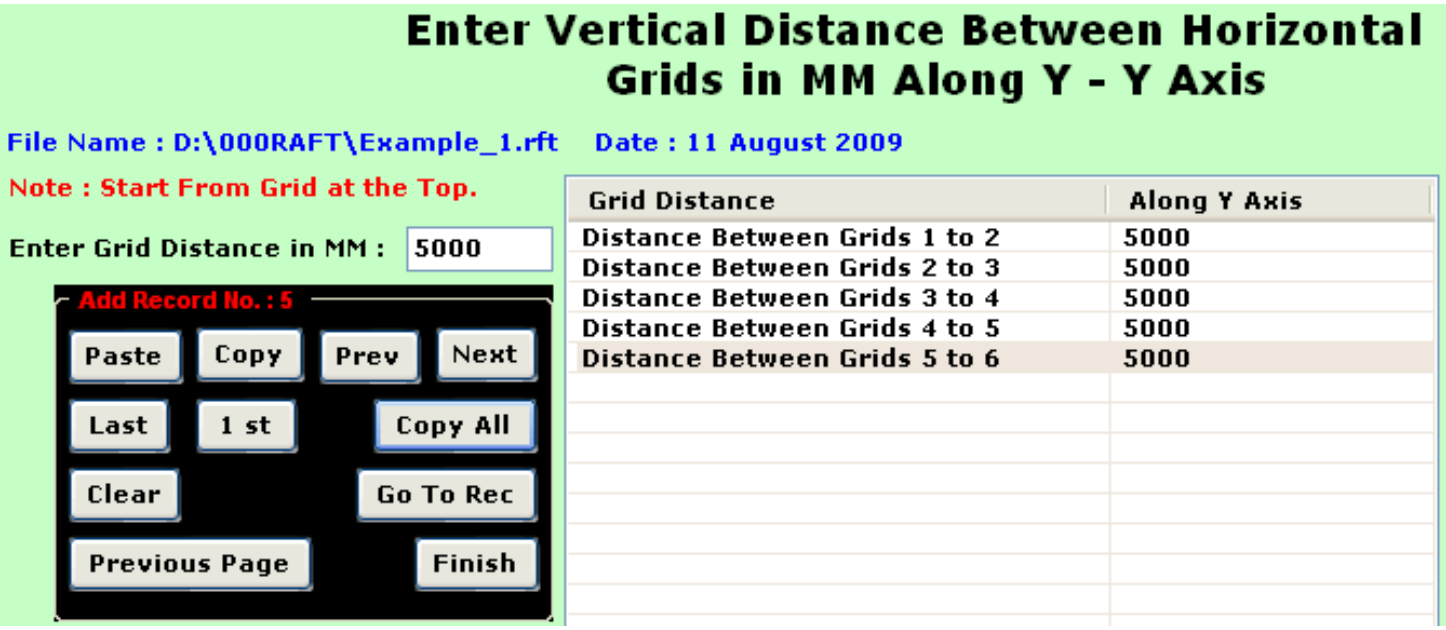
Use Copy & Paste Button to copy & paste values to different rows, in case the grid distances are not same.

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.

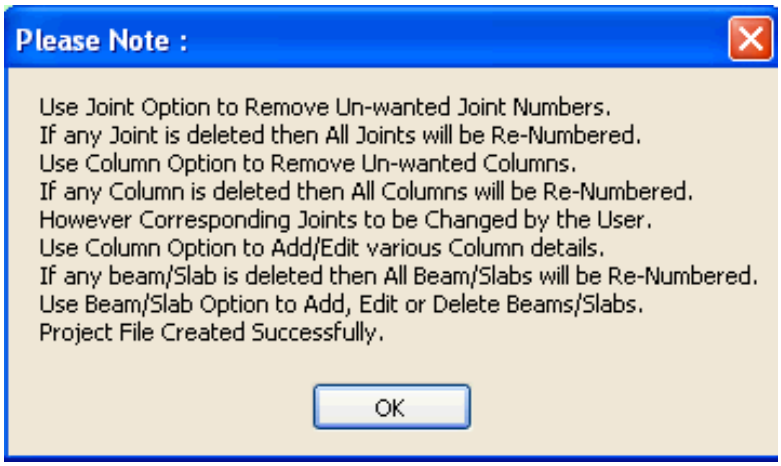
Use Copy & Paste Button to copy & paste values to different rows, in case the grid distances are not same.

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.

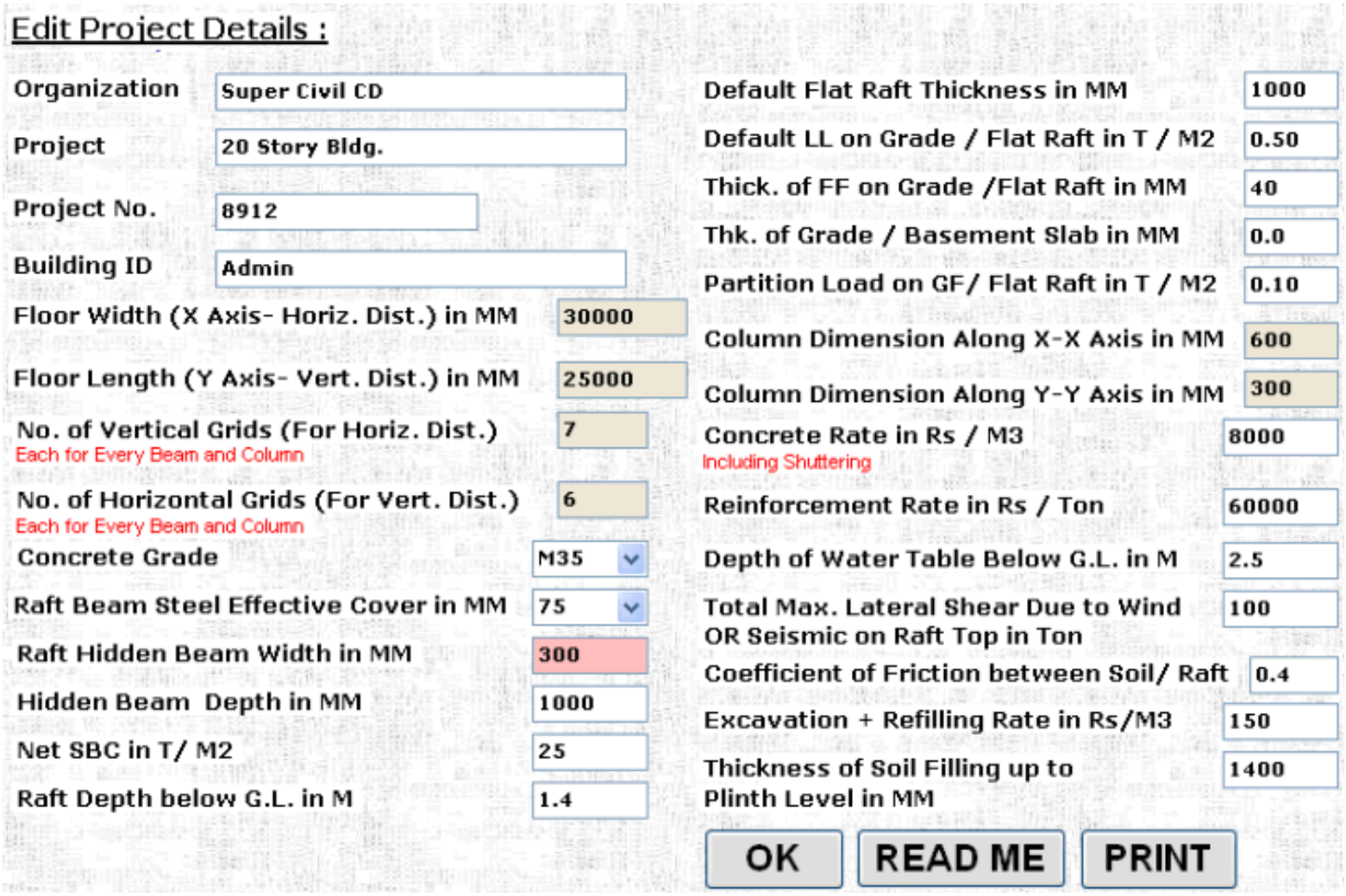
The " Print " Button is for printing of values from the Table. Use laser OR Inkjet Printer.

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. Following window will display the project file. Note that Text Boxes which as Grayed Cannot be Edited.**



Click Read Me button & go through the Important points as under.

1. Hidden Beam marking in flat raft is different than the normal floor plan GA.
2. Mark the Hidden Beams in the same way as you Mark the Normal Beams, but remember the following differences.
3. Hidden Beam depth shall = Flat Raft Thickness.
4. All Flat Raft thickness shall be uniform.
5. Initial/Trial Flat Raft Thk = Max. Span of Beam or Slab in MM / 7
6. Keep Column Size as Large as Possible.
7. Minimum Column size allowed is 300 x 300 MM.
8. Try to Avoid secondary beams, ie beams resting on one another.
9. Min Reinforcement % in Either Direction = 0.12 % for Raft Slab.
10. Convert wall line load in to UDL as w/(0.6 * slab_span) and avoid beam below wall line load.
11. Hence convert all internal partitions in to equivalent UDL & avoid beams.
12. Try to Keep Minimum spacing of beams at 2.0 M C/C.
13. In order to get most optimum design keep the slab & beam spans uniformly within 20 % of each other.
14. Spacing of columns shall be as uniform as possible within say 20 % of each other.
15. BMs are calculated at Column face.
16. One Way Shears are calculated at effective depth from Column face.
17. BM & SF are calculated at Beam Center Line for Beam to Beam Joint.
18. Flat Raft Beam thickness to be revised, if steel area exceeds 245 cm2.
19. In Case of Un-safe Beam design Reframe the Plan or Revise Slab Thickness or Column Size or Concrete Grade.
20. Minimum Flat Raft Slab Thickness Shall be 200 MM.
21. Maximum Raft Slab Beam Width Shall be Less than 8000 MM.
22. Main Steel is in Longer Direction & not in Shorter Direction.
23. Convert Non Rectangular Column into Equivalent Square Col. before Designing.
24. Min Reinforcement % in Either Direction = 0.20 % for Hidden beams.
25. Reinforcement Spacing Shall not Exceed 2 x Depth.
26. Use High Grade of Concrete Preferably M 30 or M 35.
27. At Ends and Corners the Flat Raft shall Extend up to or beyond Outer Edge of Column Else Flat Raft will Fail in Punching.
28. Large openings cannot be provided in Flat Raft.
29. Small openings <= 300 MM can be located near the center of Slab.
30. Staircase / Lift Well panel shall be treated as normal slab & not as opening, Program will calculate the Loads automatically.

STEP NO. 1 IS OVER.

LEARN FLAT RAFT STEP BY STEP

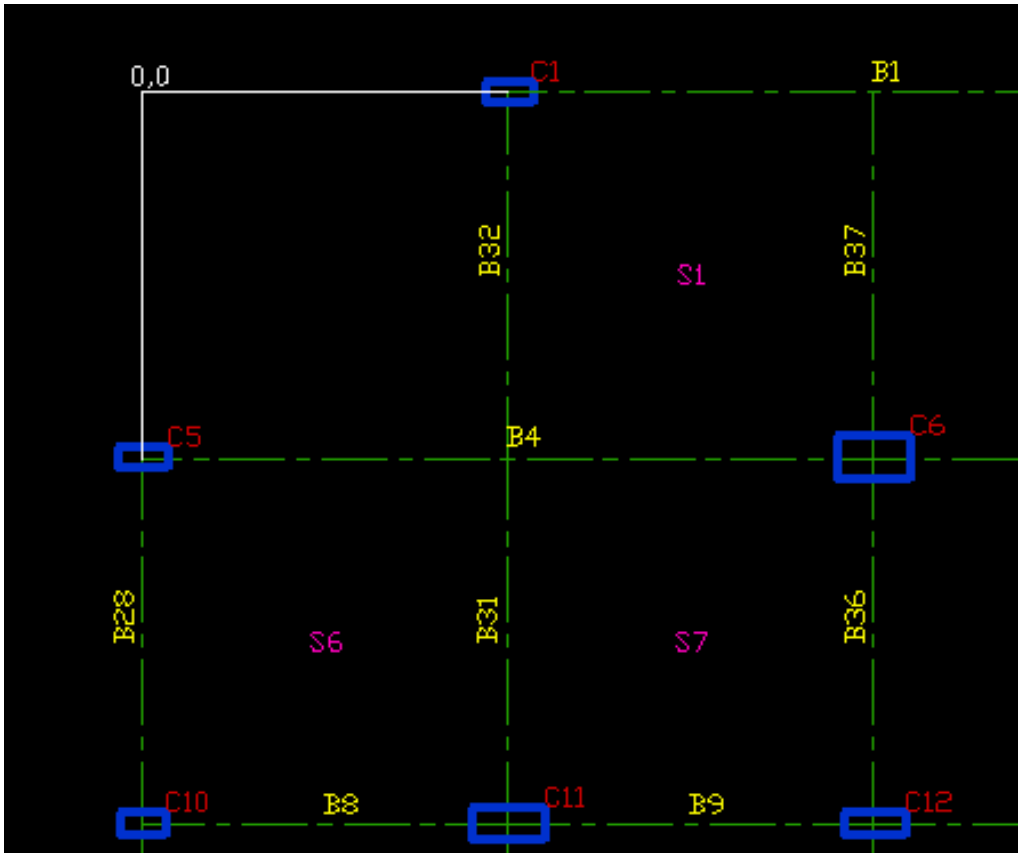
STEP NO. 2 (Alternate) : Scan Joint, Beam, Column & Slab Data from AutoCAD Drawing

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

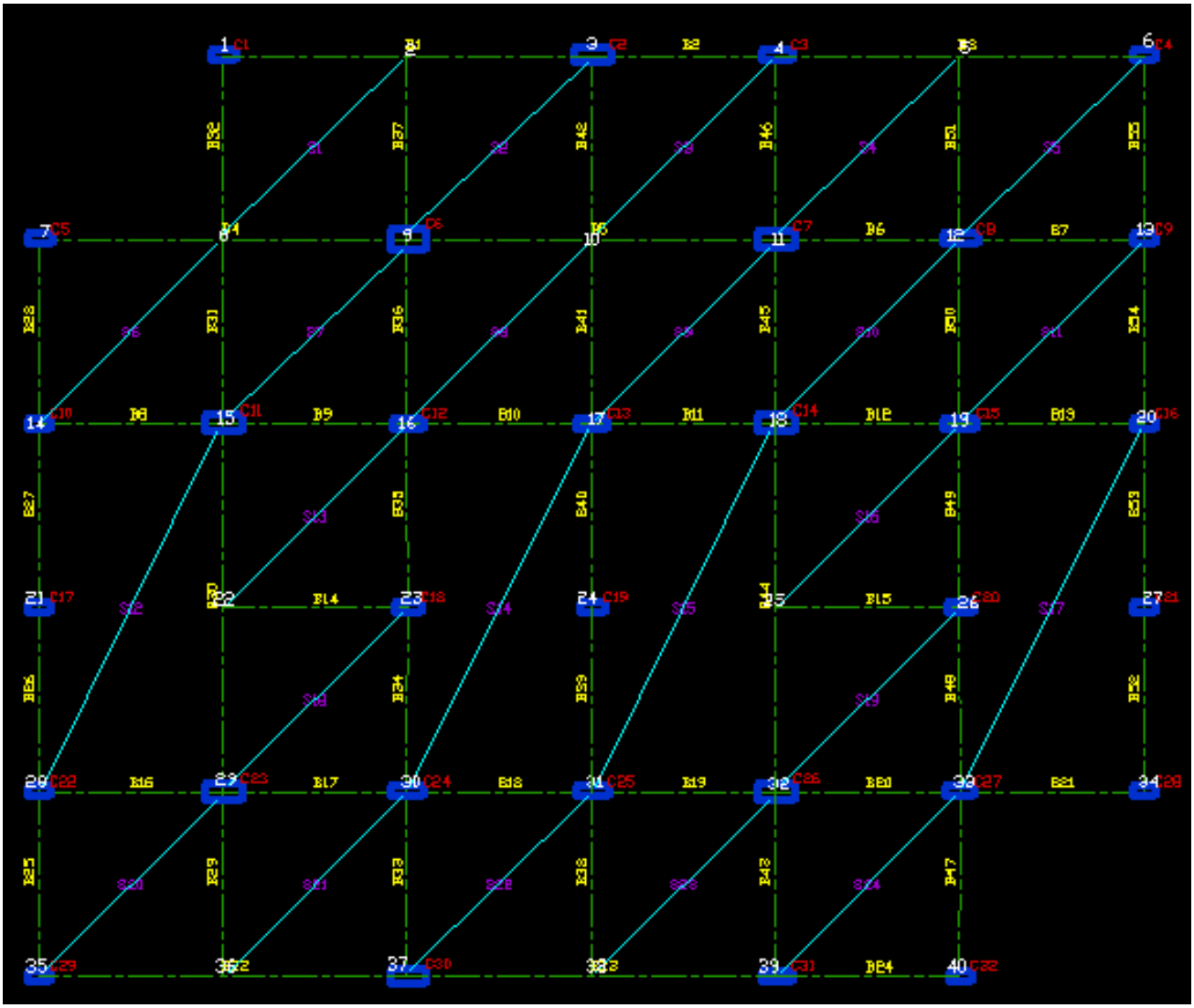
- **The Drawing Components to be drawn to exact scale and in Millimeter (MM).**

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.



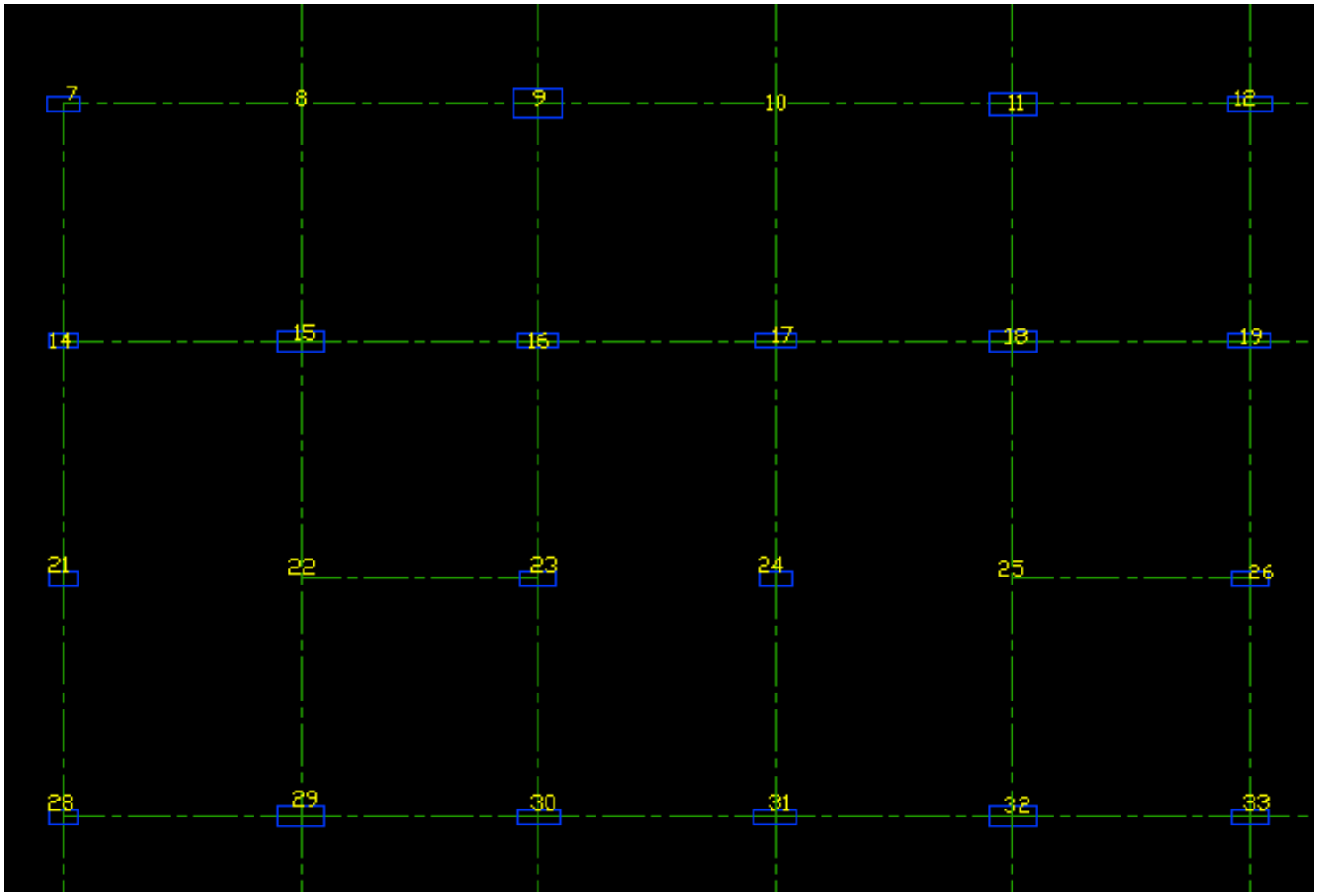
Shown below is a Typical RCC Plan in AutoCAD :



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

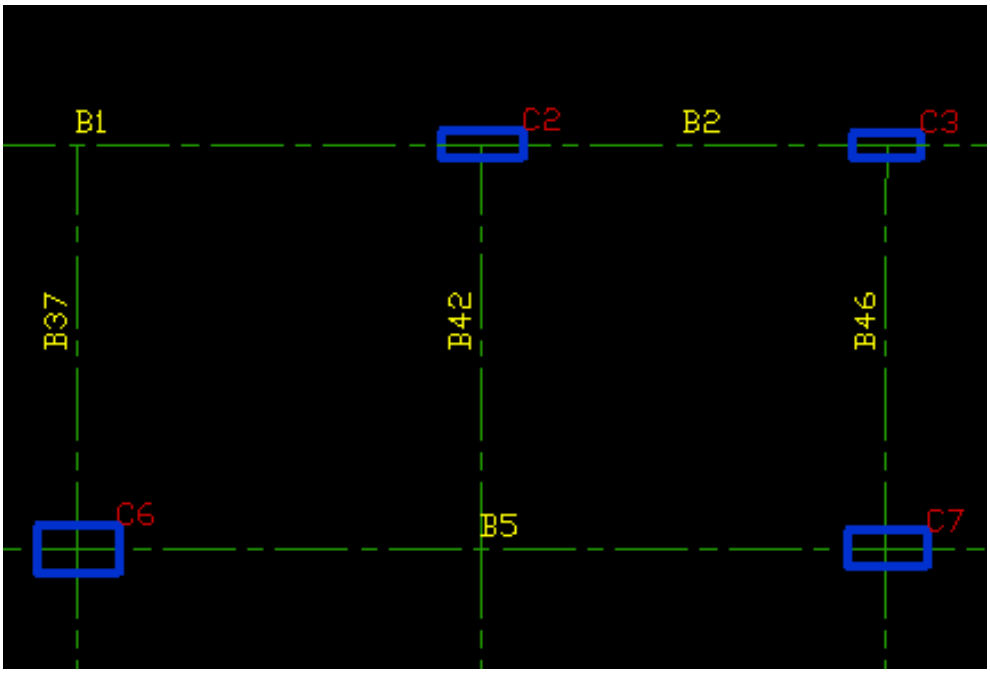


BEAM

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

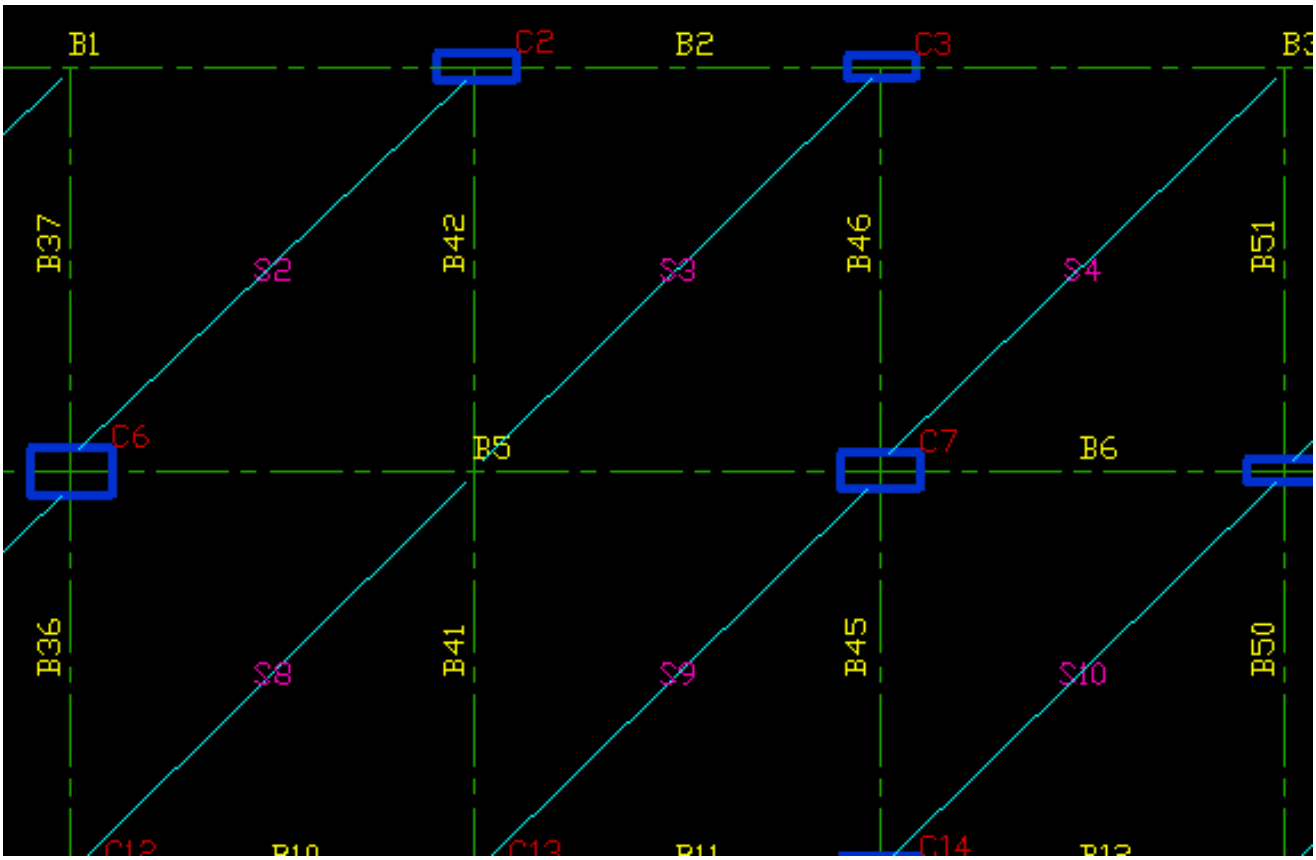
BEAM NUMBERS

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

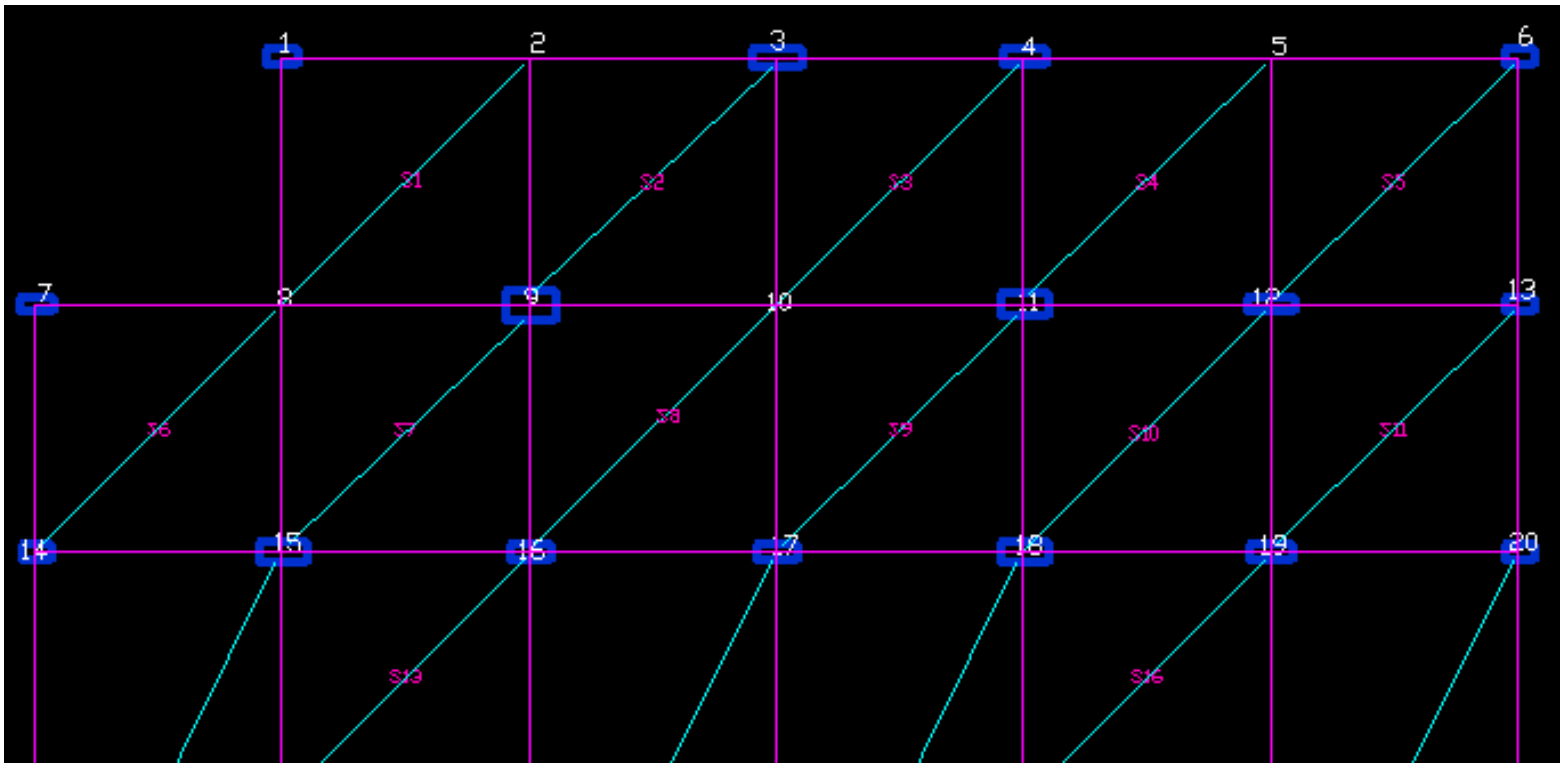
All Slab Numbers should be in the Layer SLABTEXT.
The Slab Text (No.) to be drawn near to the centre of the Slab .
Draw text using 'Single Line Text' option in AutoCAD.
Slab Nos. should not be repeated.
Slabs should be Serially Numbered.
Slab Nos should be prefixed with a "S" (ie. S1, S2)
Slab Text shall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

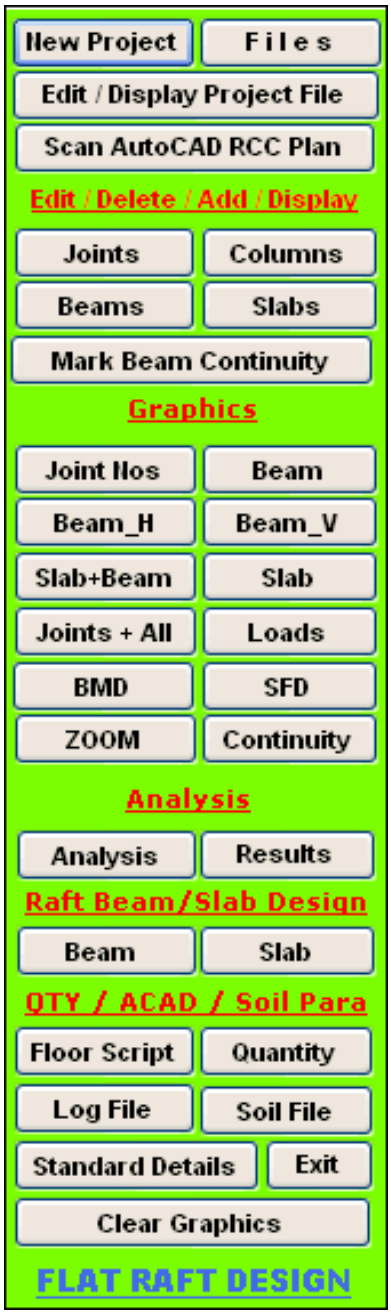
CONTINUITY

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.



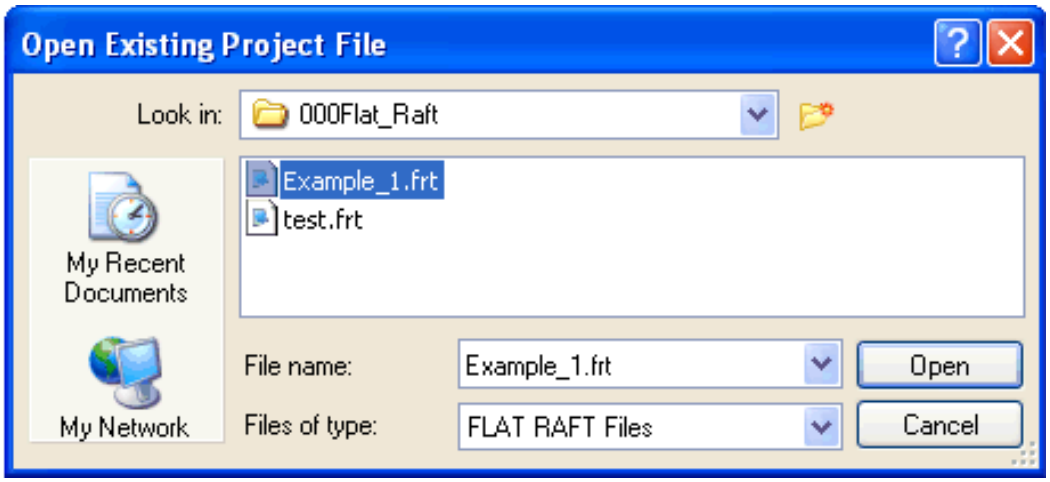
- **Once the drawing is completed, save the drawing in AutoCAD's DXF Format.**

- **Now Start FLAT RAFT.**

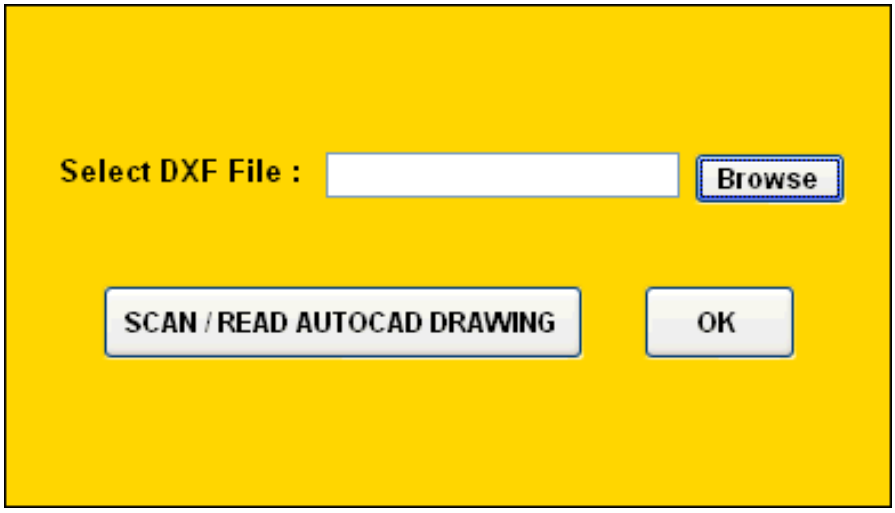


- **When Program starts, the graphics above is displayed.**

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



- **Now select Example _1.frt 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.

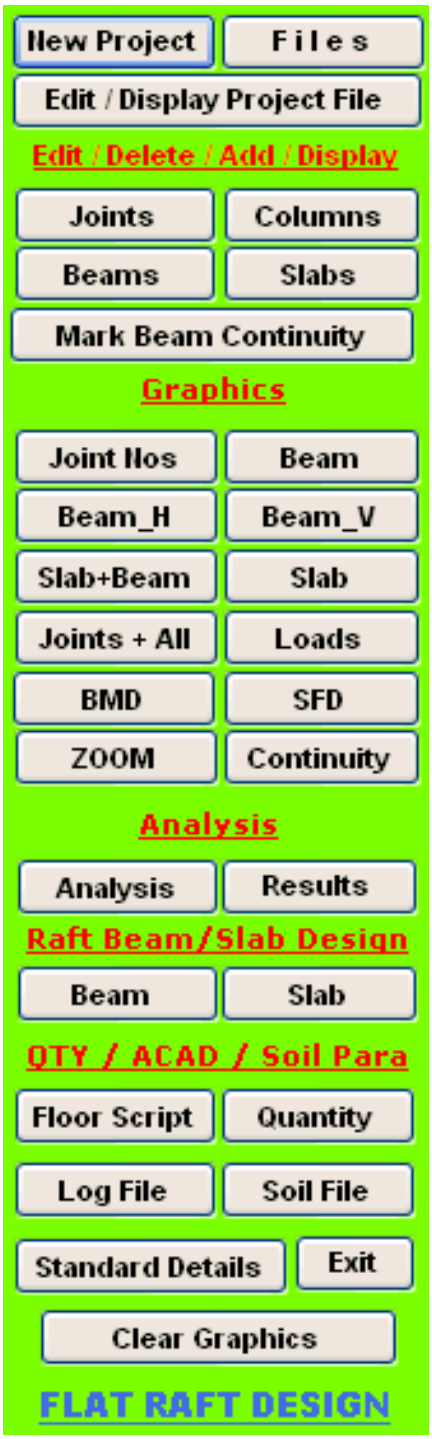
	2. Draw the Joints in JOINTS layer.
	3. Columns are usually marked in Architectural Plan. Draw the Column Nos in COLUMNTEXT layer.
	4. Draw Slab Diagonal lines in the layer SLAB and Draw the Slab Nos in layer SLABTEXT.
	5. Mark Beam Continuity in the layer CNT.
	6. Move the Top Left Corner of the Plan 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 RAFT STEP BY STEP

STEP NO. 2 : Automatic Joint Number Creation

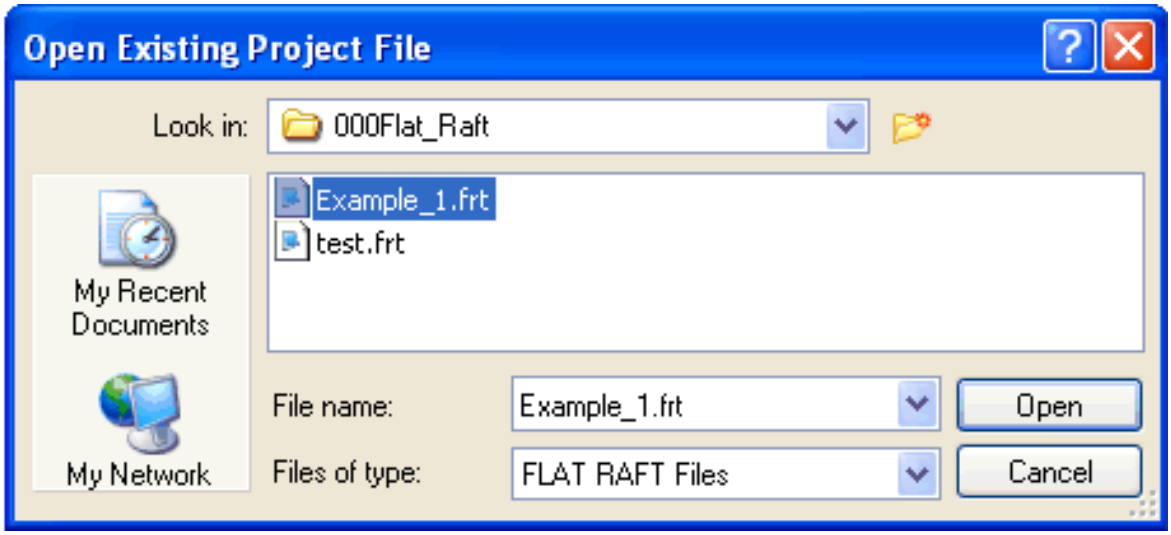


- **When Program starts, the Menu above is displayed. Under the Graphics Heading following options are displayed.**

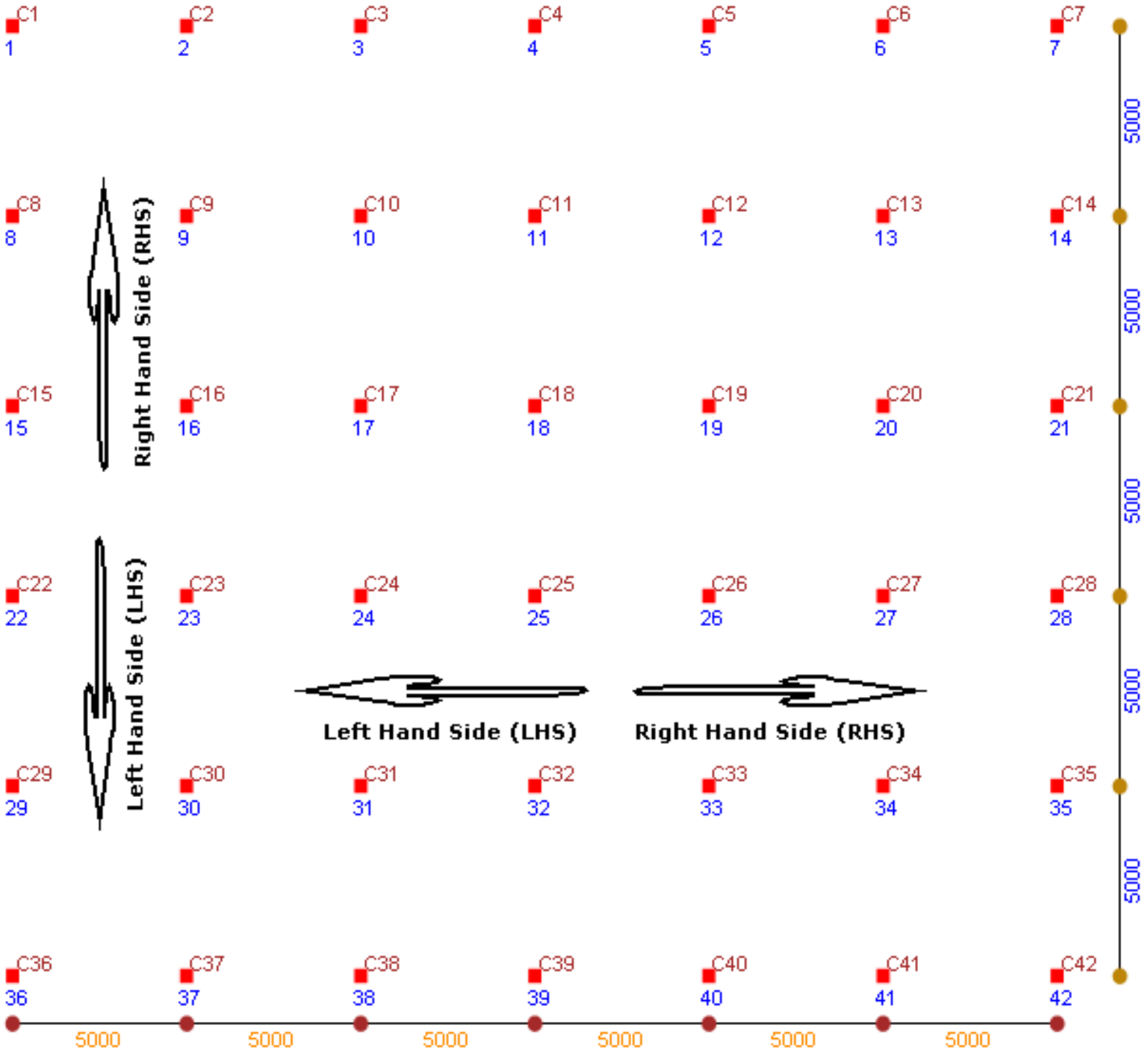
  • Joint Nos
  • Beam
  • Beam_H (For Display of Only Horizontal Beams).
  • Beam_V (For Display of Only Vertical Beams).
  • Slab + Beam (Raft Beams, Slabs & Columns are displayed).
  • Slab (Only Slabs & Columns are displayed).
  • Joints + ALL (For Display of Joints, Columns, Beams & Slabs)
  • Loads (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.

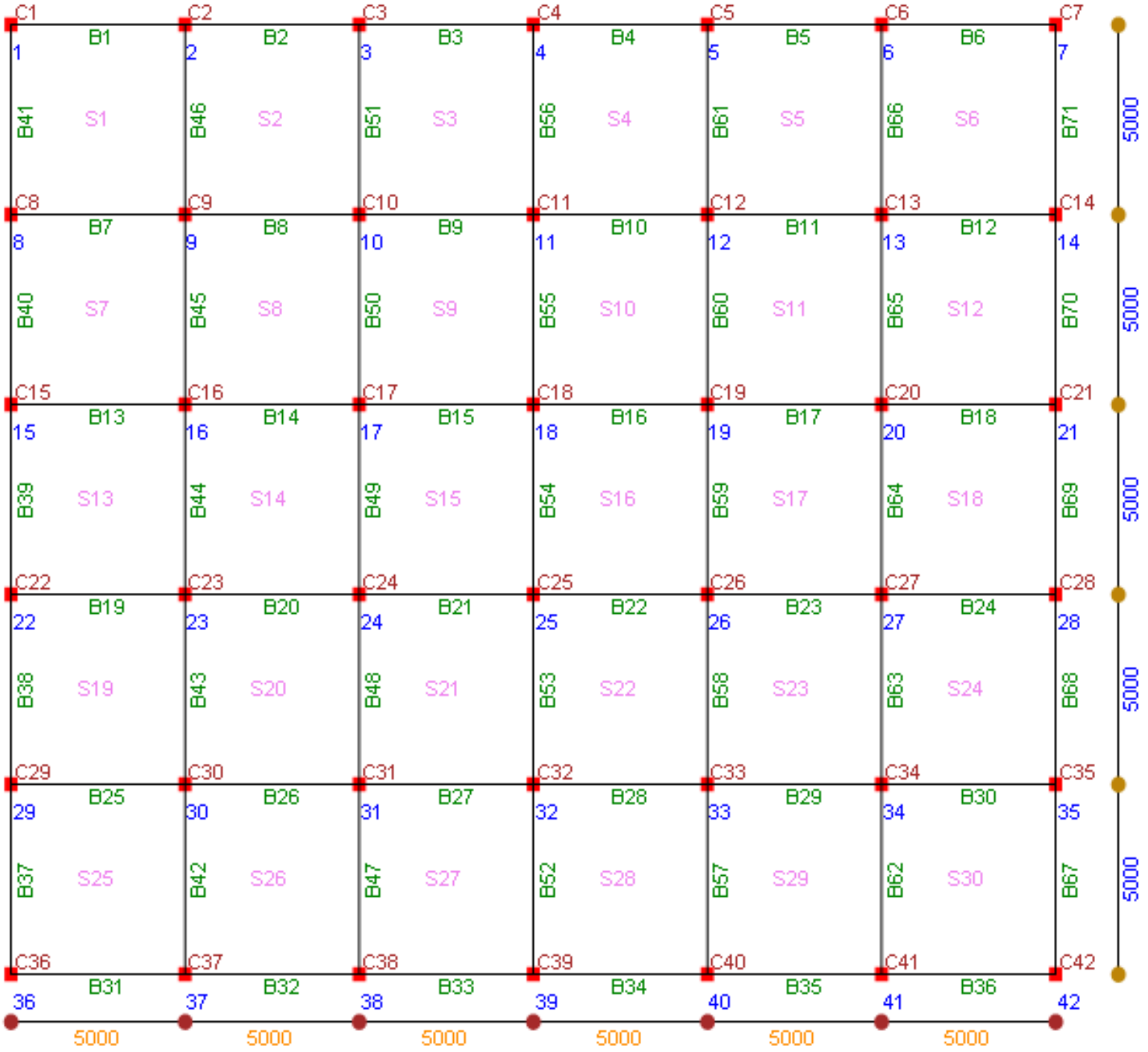
  Following Graphics is displayed.



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

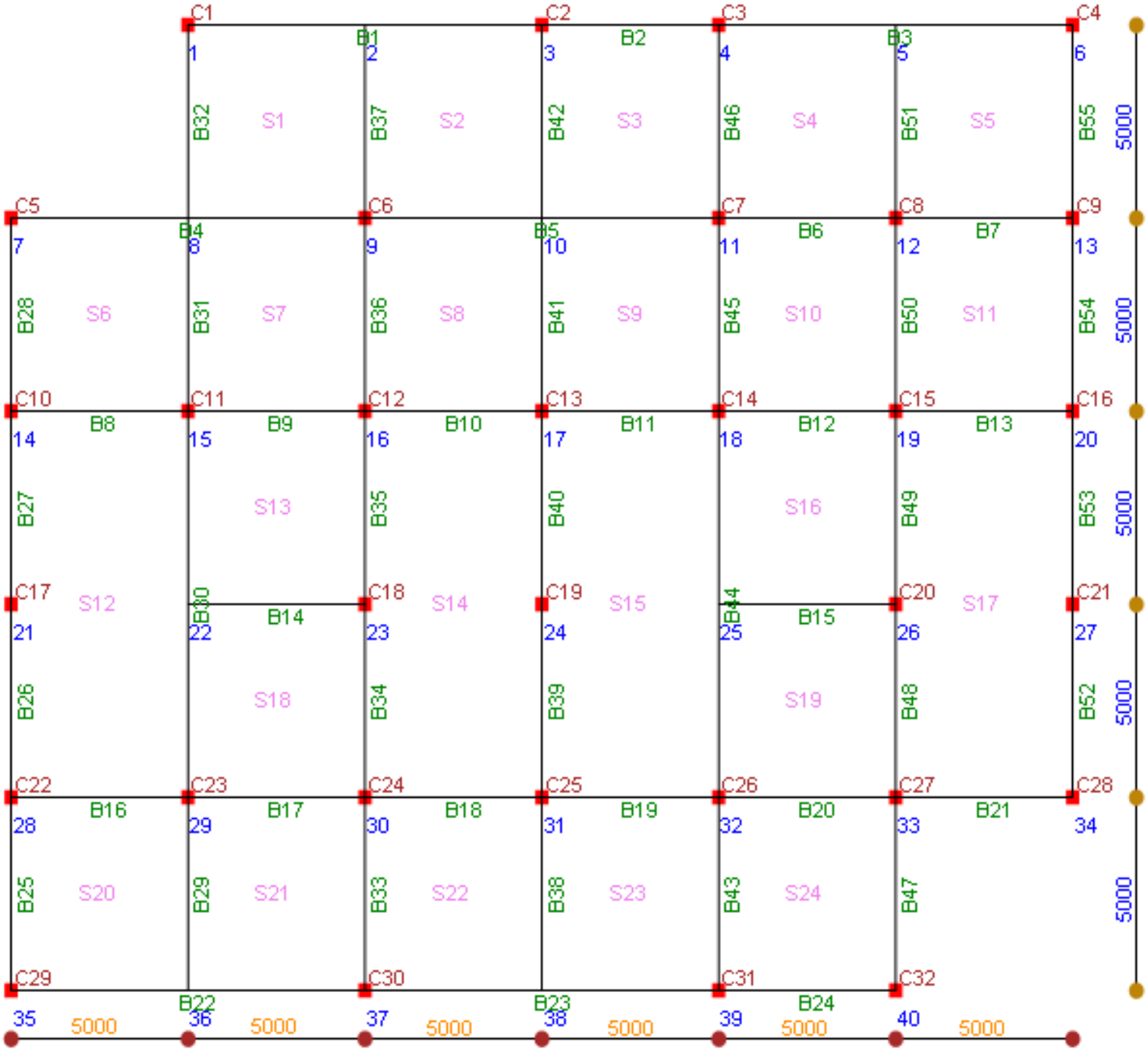


- **Note that Joints Numbers (Including X & Y Co-Ordinates) and Columns are created and displayed automatically at all the intersections of vertical & horizontal grids. Some of the Joint numbers may not be required. A Joint represents a column location or an intersection between 2 beams. The beams are 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.



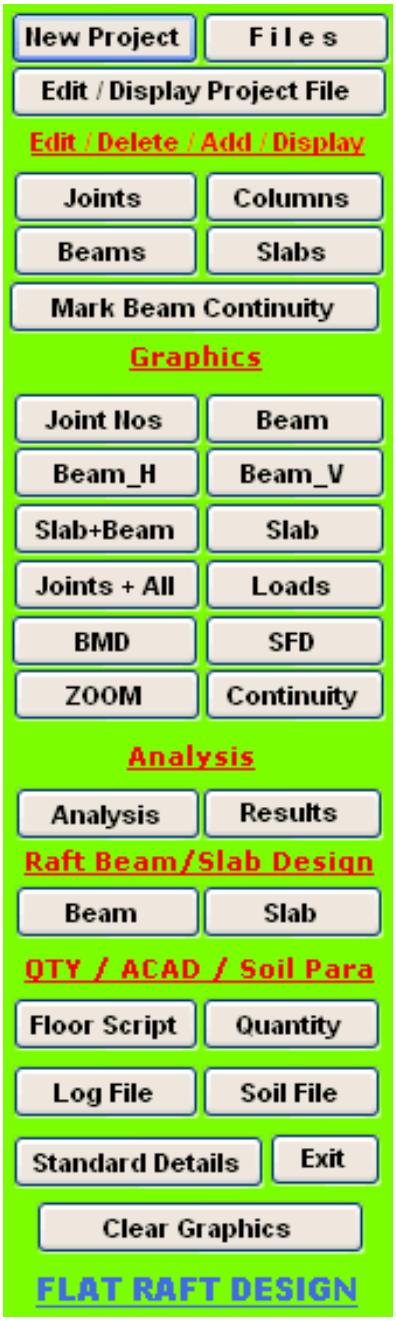
ACTUAL REQUIRED FLOOR PLAN

- **Our Actual Raft 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 RAFT STEP BY STEP

STEP NO. 3 : Delete Un-Wanted Joints

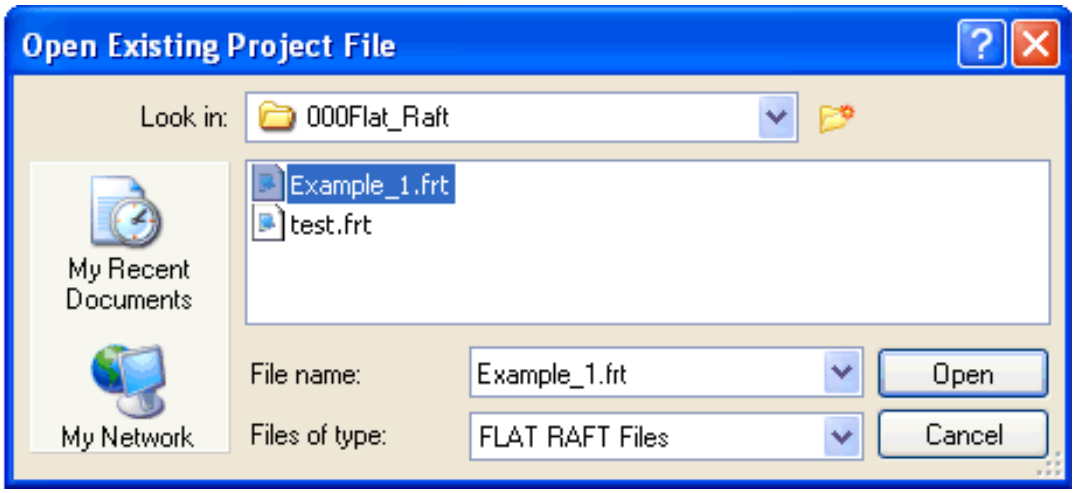


When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.

- **Joints**
- **Columns**
- **Beams**
- **Slabs**
- **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

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

Joint No. 1

X Co_Ordinate 0

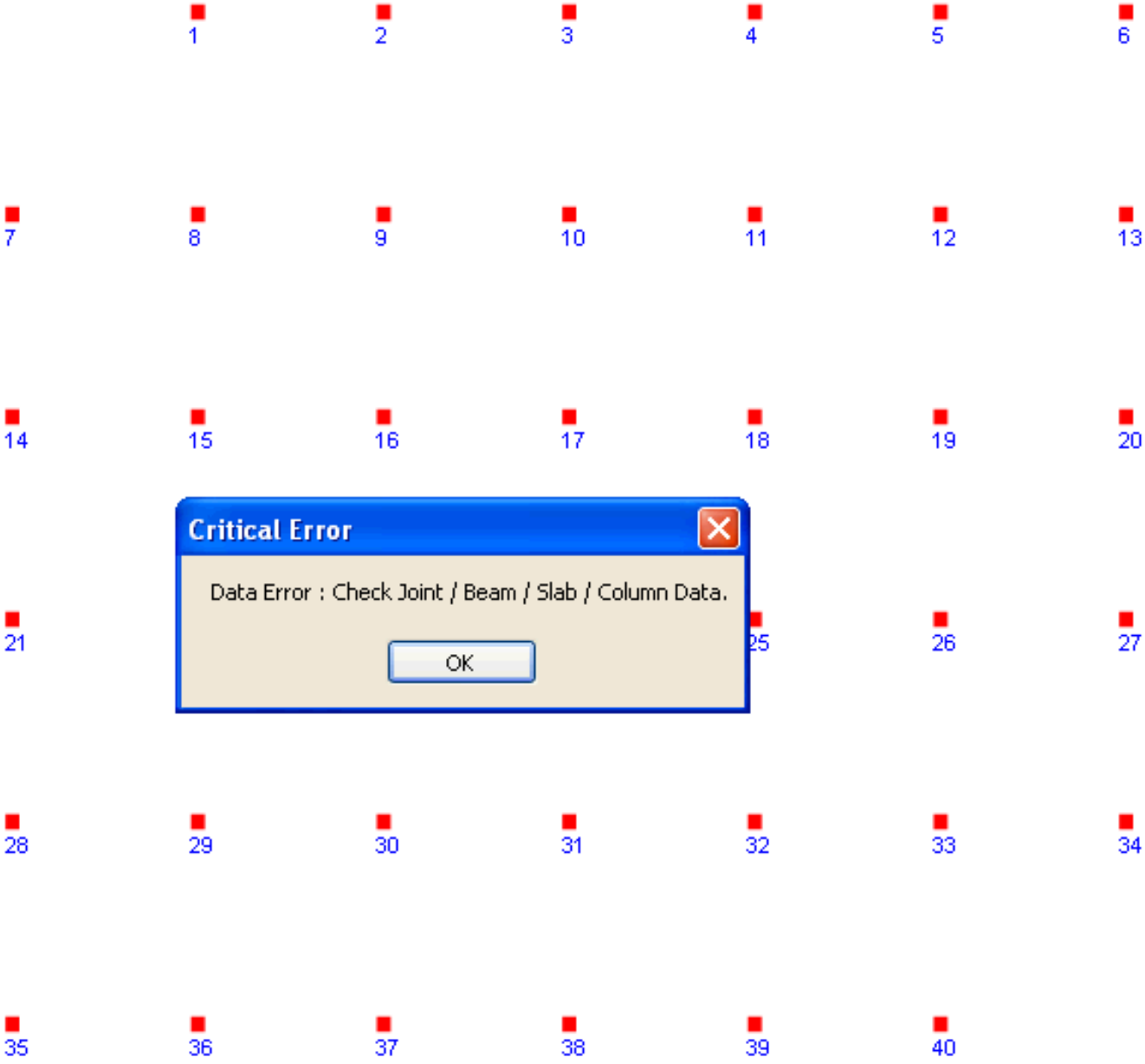
Y Co_Ordinate 0

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

- **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.**

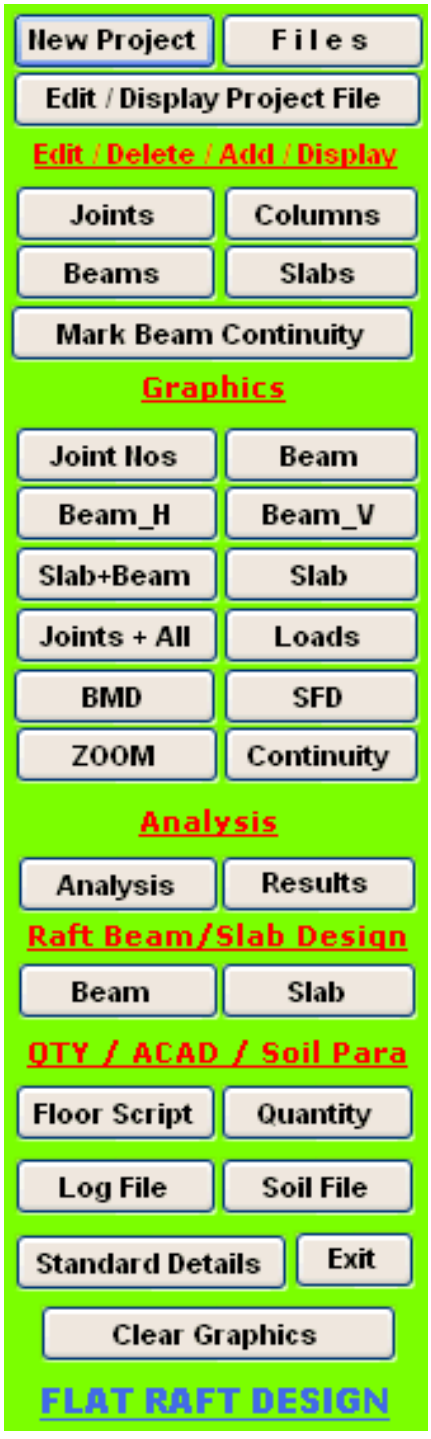
1. Origin (0,0) is at Top Left Hand Corner. Co-Ordinates Cannot be Negative.
2. There shall not be any difference in Maximum Horizontal & Vertical Distance between Project File & Joint File.
3. Joint Number should start with 1 & not 0.
4. Joints Numbers cannot be repeated.
5. Co-ordinates cannot be repeated.
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 RAFT STEP BY STEP

STEP NO. 4 : Delete & Edit Raft Beams

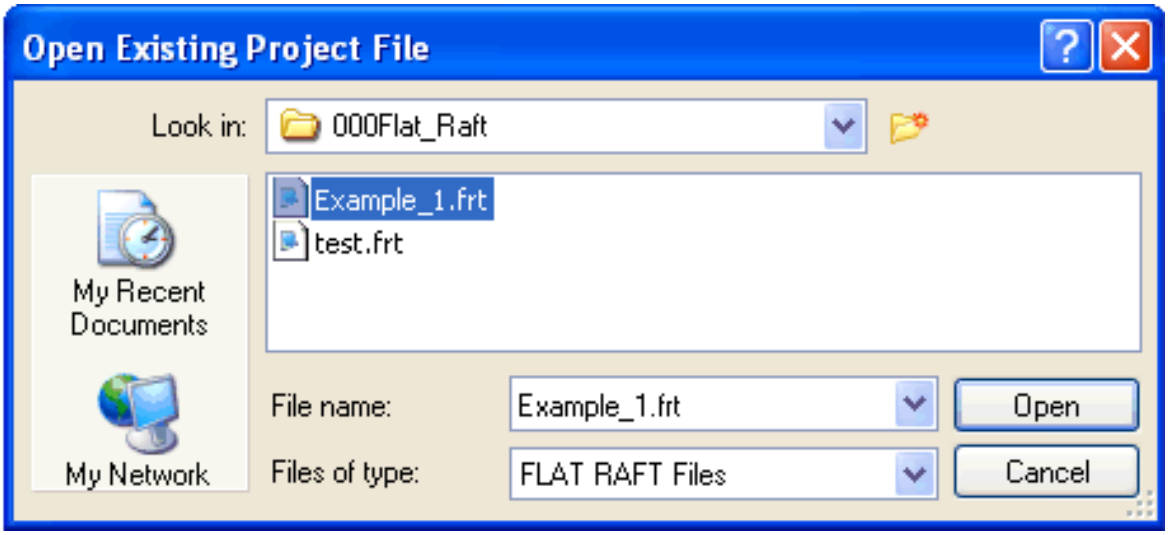


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **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 / RAFT HIDDEN BEAM DETAILS

Raft Beam #	LHS Joint #	RHS Joint #	Width	Depth	Extra UDL
B1	1	3	1250	1000	1
B2	3	4	1250	1000	1
B3	4	6	1250	1000	1
B4	7	9	2500	1000	1
B5	9	11	2500	1000	
B6	11	12	1250	1000	
B7	12	13	1250	1000	
B8	14	15	1250	1000	
B9	15	16	1250	1000	
B10	16	17	1250	1000	
B11	17	18	1250	1000	
B12	18	19	1250	1000	
B13	19	20	1250	1000	
B14	22	23	1250	1000	
B15	25	26	1250	1000	
B16	28	29	1250	1000	
B17	29	30	1250	1000	
B18	30	31	1250	1000	
B19	31	32	1250	1000	
B20	32	33	1250	1000	
B21	33	34	1250	1000	1
B22	35	37	1250	1000	1

- **Here we have 71 numbers of 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.

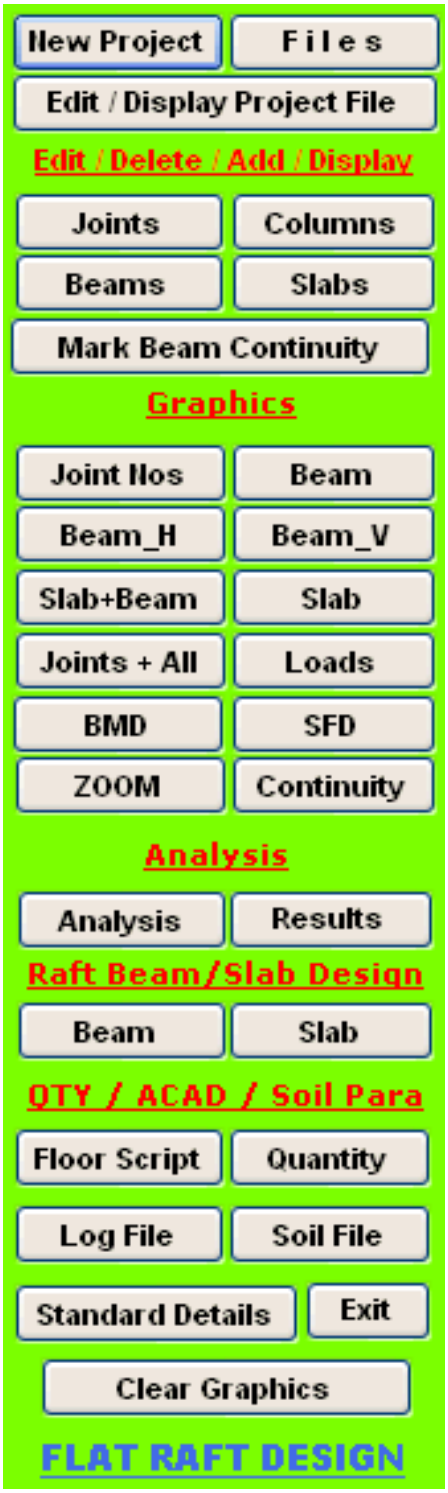
  In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- **Extra UDL can be Added / Edited for individual Beams by clicking at its Text Box.**
  Hidden Beam width is automatically calculated by the Program during Analysis.
  Hidden beam Depth / Thickness can be changed using Project Edit option.
  Beam Span is displayed in Yellow Text Box.
- **Now click the " Read Me " button, and Read the important messages displayed for guidance.**
- **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 RAFT STEP BY STEP

STEP NO. 5 : Delete & Edit Columns

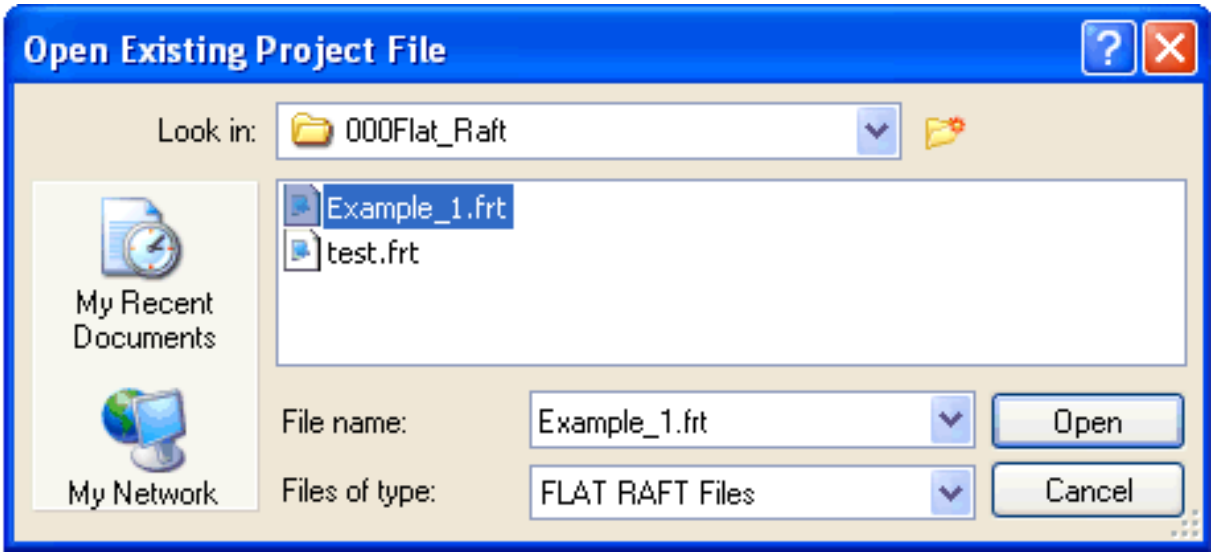


- **When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.**

  - **Joints**
  - **Columns**
  - **Beams**
  - **Slabs**
  - **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

Col. #	Joint #	X-X Dim	Y-Y Dim	DL+LL	DLL+LL+WLX	DL+LL+WLY
C1	1	650	450	87	100	75
C2	3	650	450	133	150	120
C3	4	650	450	133	150	120
C4	6	650	450	87	100	75
C5	7	650	450	105	120	95
C6	9	650	450	323	350	300
C7	11	650	450	238	250	210
C8	12	650	450	160	180	140
C9	13	650	450	87	100	75
C10	14	650	450	87	100	75
C11	15	650	450	238	250	210
C12	16	650	450	160	180	140
C13	17	650	450	160	180	140
C14	18	650	450	238	250	210
C15	19	650	450	87	100	75
C16	20	650	450	87	100	75
C17	21	650	450	70	85	55
C18	23	650	450	133	150	120
C19	24	650	450	105	120	95
C20	26	650	450	133	150	120
C21	27	650	450	78	90	60
C22	28	650	450	87	100	75
C23	29	650	450	238	250	210

- **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).

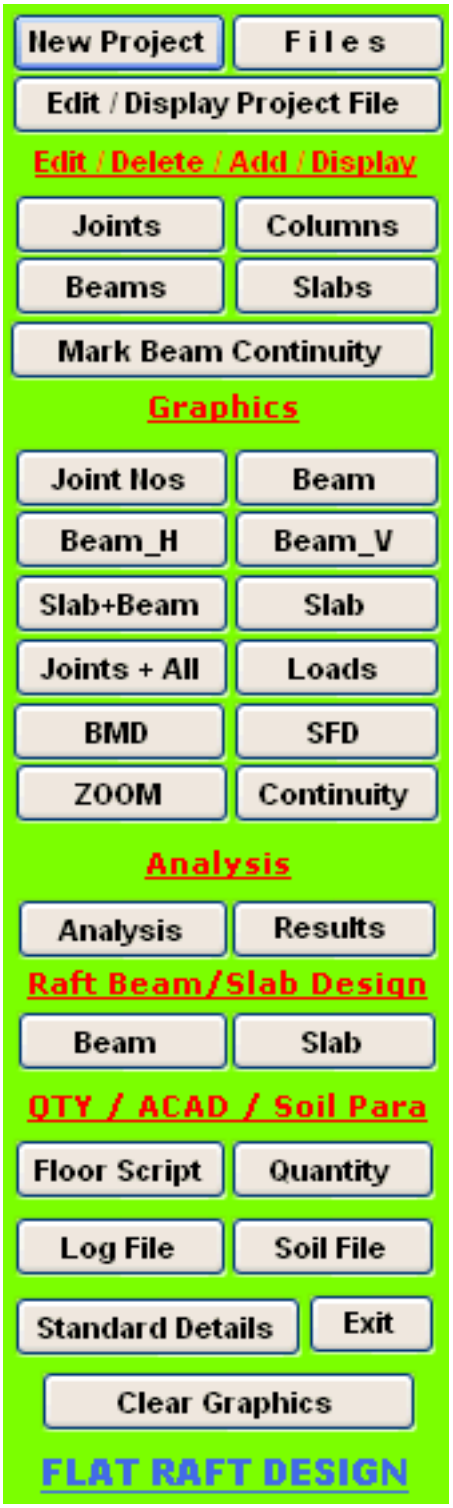
  In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- **All other Column Parameters Viz; X-X Dim, Y-Y Dim, DL + LL on Column, DL + LL + Wind / Seismic Load (From X-X Direction) and DL + LL + Wind / Seismic Load in Ton (From Y-Y Direction) can be Added / Edited for individual Columns by clicking at respective Text Boxes.**
  I have Changed Column Size & added Column Loads for the respective 3 Load Cases.
- **Now click the " Read Me " button and go through the important messages displayed for guidance.**
- **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 RAFT STEP BY STEP

STEP NO. 6 : Delete & Edit Flat Raft Slabs

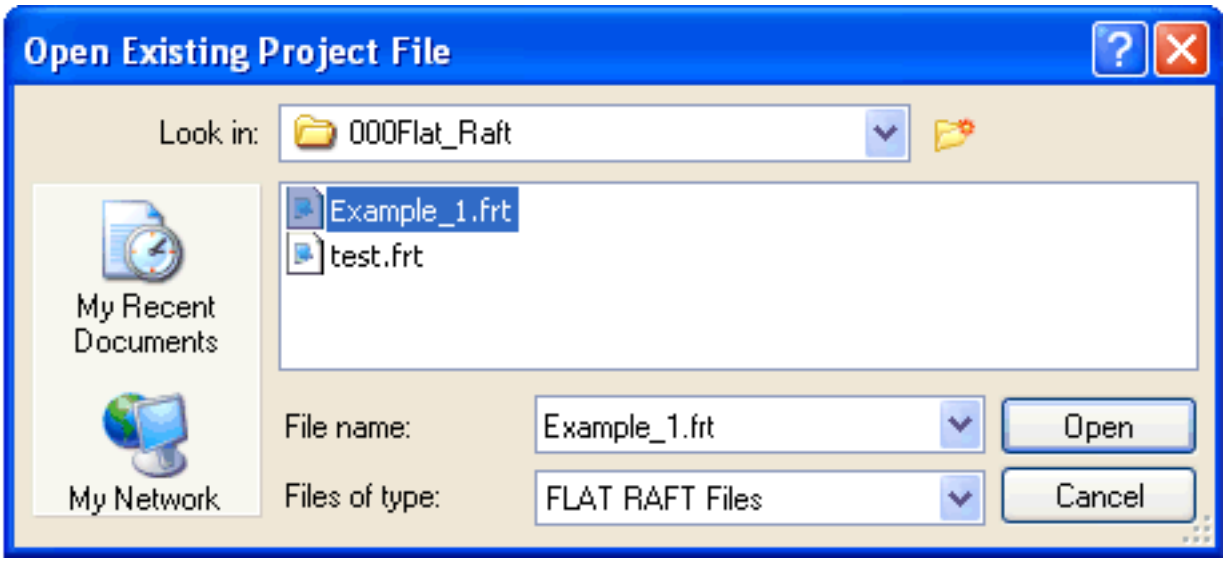


When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.

- **Joints**
- **Columns**
- **Beams**
- **Slabs**
- **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 / FLAT RAFT DETAILS

Raft Slab #	Left Btm Joint #	Right Top Joint #	Raft Slab Thickness
S1	8	2	1000
S2	9	3	1000
S3	10	4	1000
S4	11	5	1000
S5	12	6	1000
S6	14	8	1000
S7	15	9	1000
S8	16	10	1000
S9	17	11	1000
S10	18	12	1000
S11	19	13	1000
S12	28	15	1000
S13	22	16	1000
S14	30	17	1000
S15	31	18	1000
S16	25	19	1000
S17	33	20	1000
S18	29	23	1000
S19	32	26	1000
S20	35	29	1000
S21	36	30	1000
S22	37	31	1000
S23	38	32	1000

- **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).

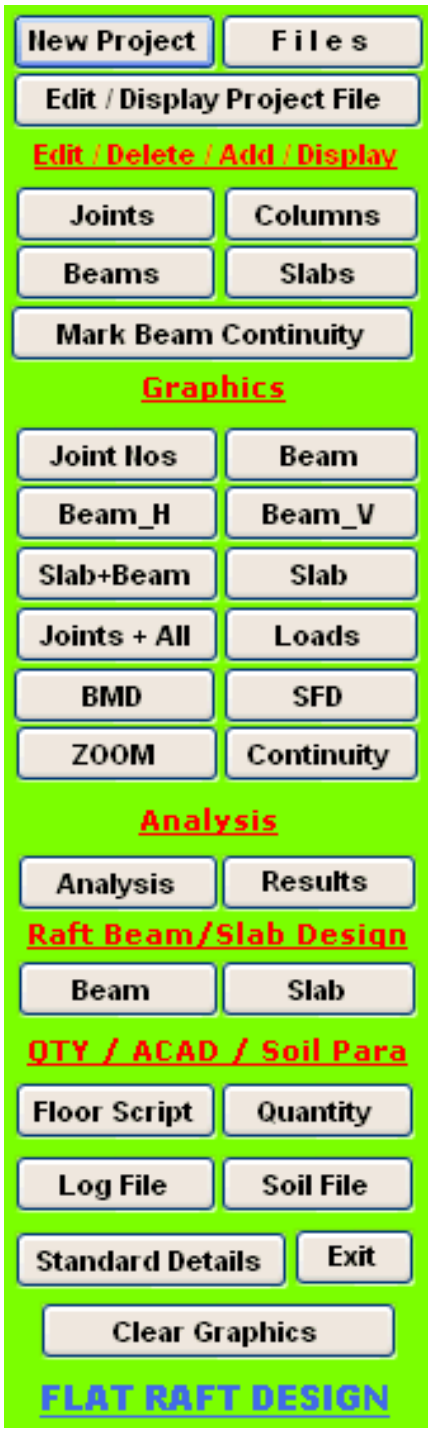
In case you would like to EXIT program after partial editing, first use " Update " button to save your work & then click " OK " button. The program will ask you about exiting, click Yes & quit.

- **Flat Raft Slab Thickness can be Edited using Project Edit option only.**
  Slab Spans in either direction is displayed in Golden Color.
- **Now click the " Read Me " button and go through the important messages displayed for guidance.**
- **Now we have come to the end of Step # 6.**
  In the next step we will Add Continuity to the Hidden Flat Raft Beams.

STEP NO. 6 IS OVER.

LEARN FLAT RAFT STEP BY STEP

STEP NO. 7 : Add & Edit Flat Raft Beam Continuity

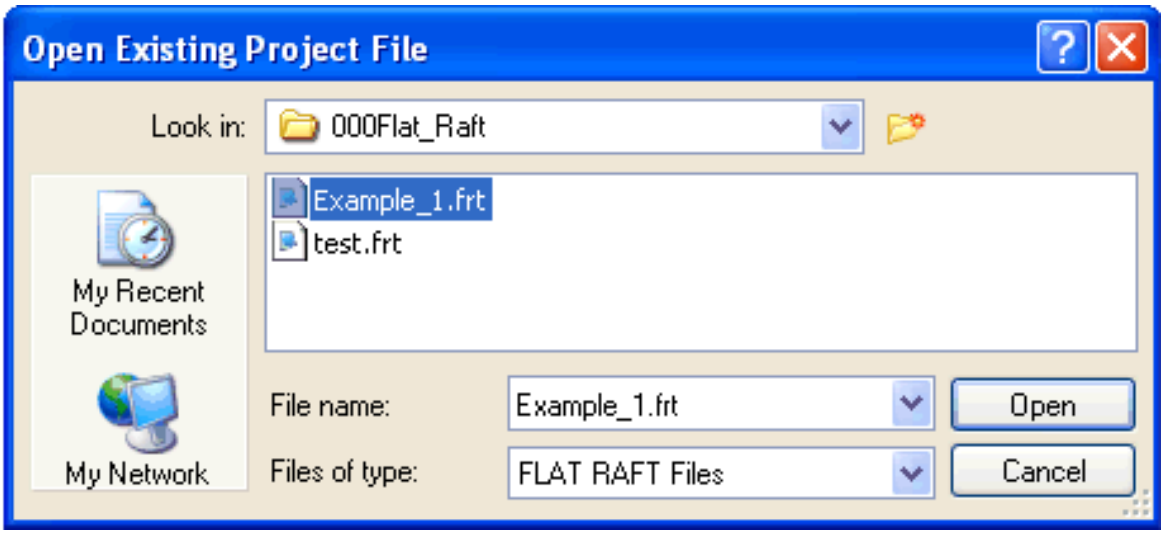


When Program starts, the Menu above is displayed. Under the Edit / Delete / Add / Display Heading following options are displayed.

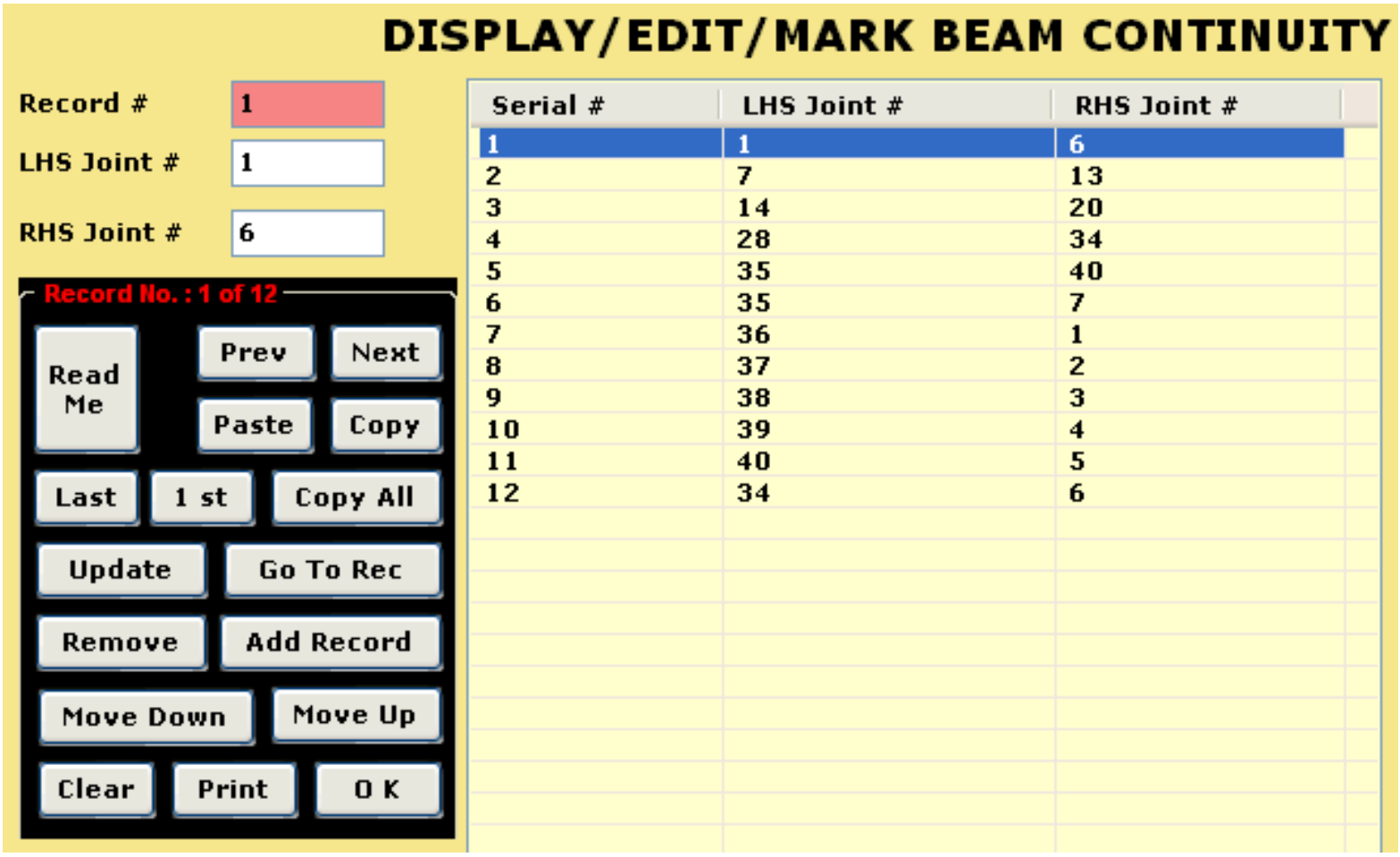
- **Joints**
- **Columns**
- **Beams**
- **Slabs**
- **Mark Raft Beam Continuity**

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) are 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 # 7.**
  In the next step we will Check our Data Input Graphically.

STEP NO. 7 IS OVER.

LEARN FLAT RAFT STEP BY STEP

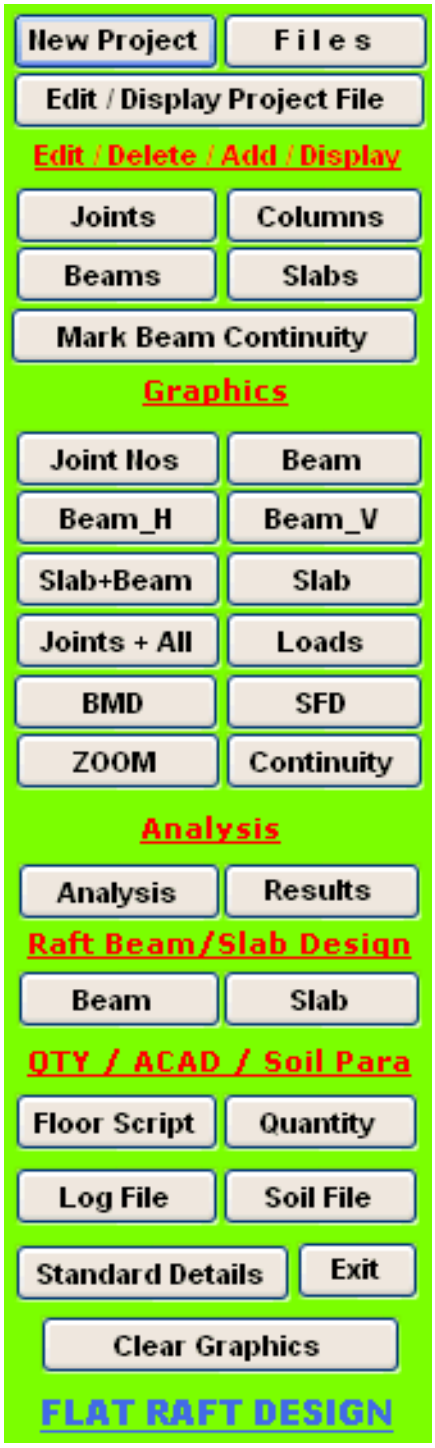
STEP NO. 8 : Data Checking Through Graphics

- **A User should thoroughly check Data Input at all stages. During Adding / Editing Data through tables, Hidden Raft Beam " SPAN " and Flat 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 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
and Data Input.
Any un-expected Diagram will reflect Data Error in the form of :

- **Incorrect Geometry (Span, Grid Dimension).**
- **Incorrect Loads.**
- **Analysis, Beam & Slab Design not performed after Editing / Adding Geometry or Loads.**

The Most effective check will be when AutoCAD drawing of Raft 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.

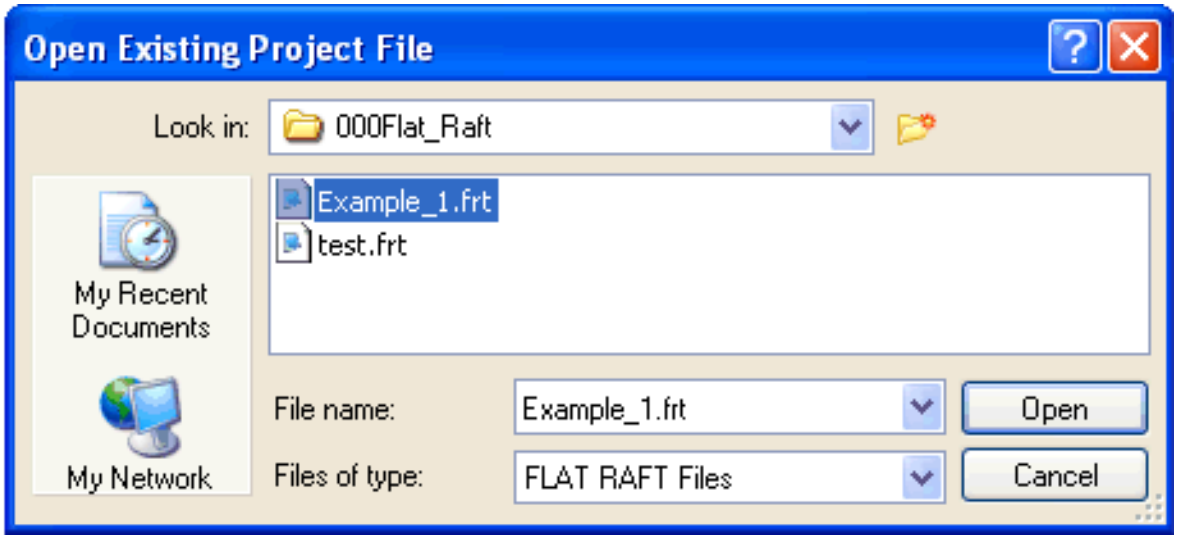

New Project
Files
Edit / Display Project File
Edit / Delete / Add / Display
Joints
Columns
Beams
Slabs
Mark Beam Continuity
Graphics
Joint Nos
Beam
Beam_H
Beam_V
Slab+Beam
Slab
Joints + All
Loads
BMD
SFD
ZOOM
Continuity
Analysis
Analysis
Results
Raft Beam/Slab Design
Beam
Slab
QTY / ACAD / Soil Para
Floor Script
Quantity
Log File
Soil File
Standard Details
Exit
Clear Graphics
FLAT RAFT DESIGN

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

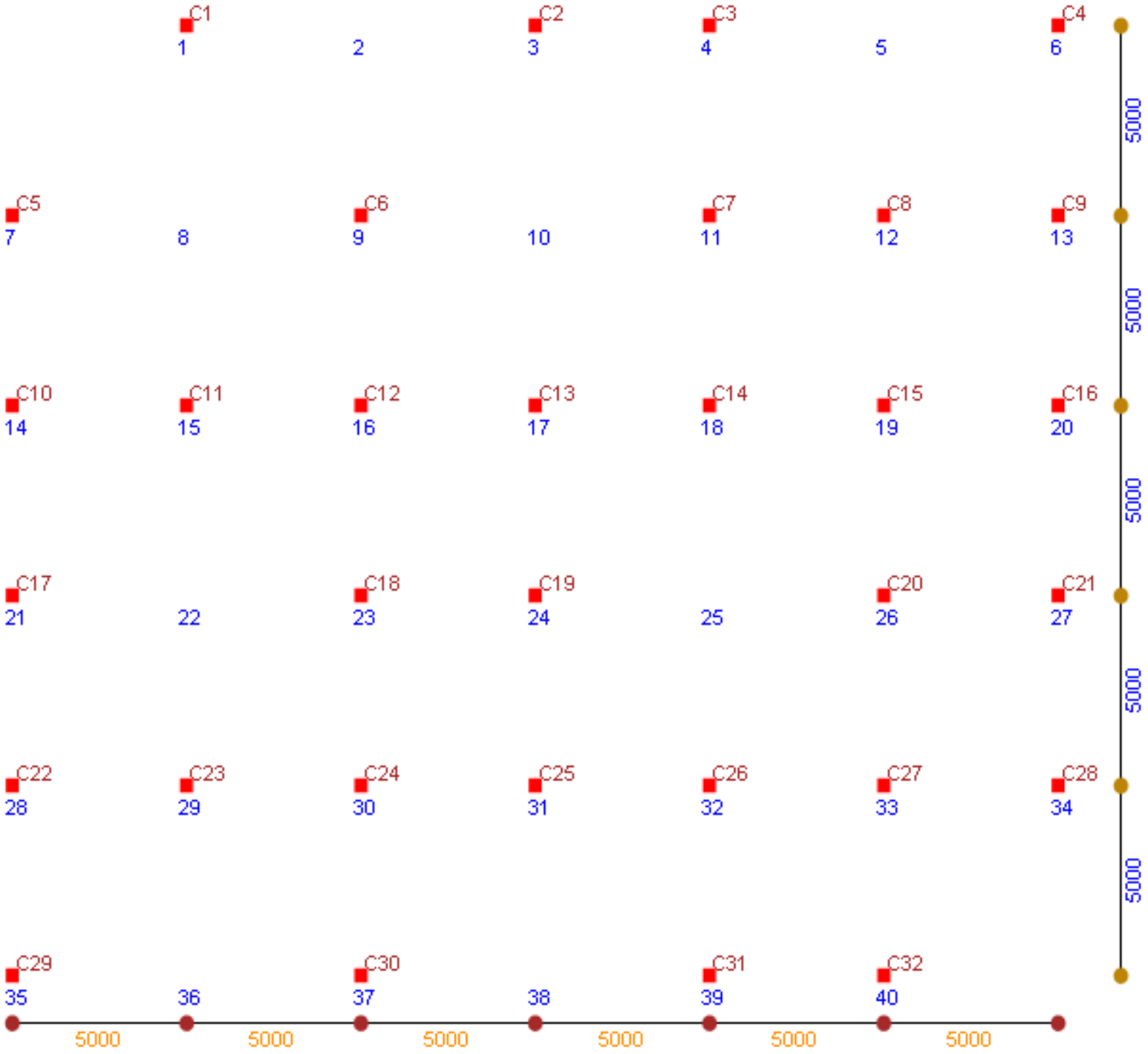
• Joint Nos
• Beam
• Beam_H (Only Horizontal Beam numbers will be Displayed).
• Beam_V (Only Vertical Beam numbers will be Displayed).
• Slab + Beam (Beams, Slabs & Columns are displayed).
• Slab (Only Slabs & Columns are displayed).
• Joints + ALL (For Display of Joints, Columns, Beams & Slabs)
• Loads (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.

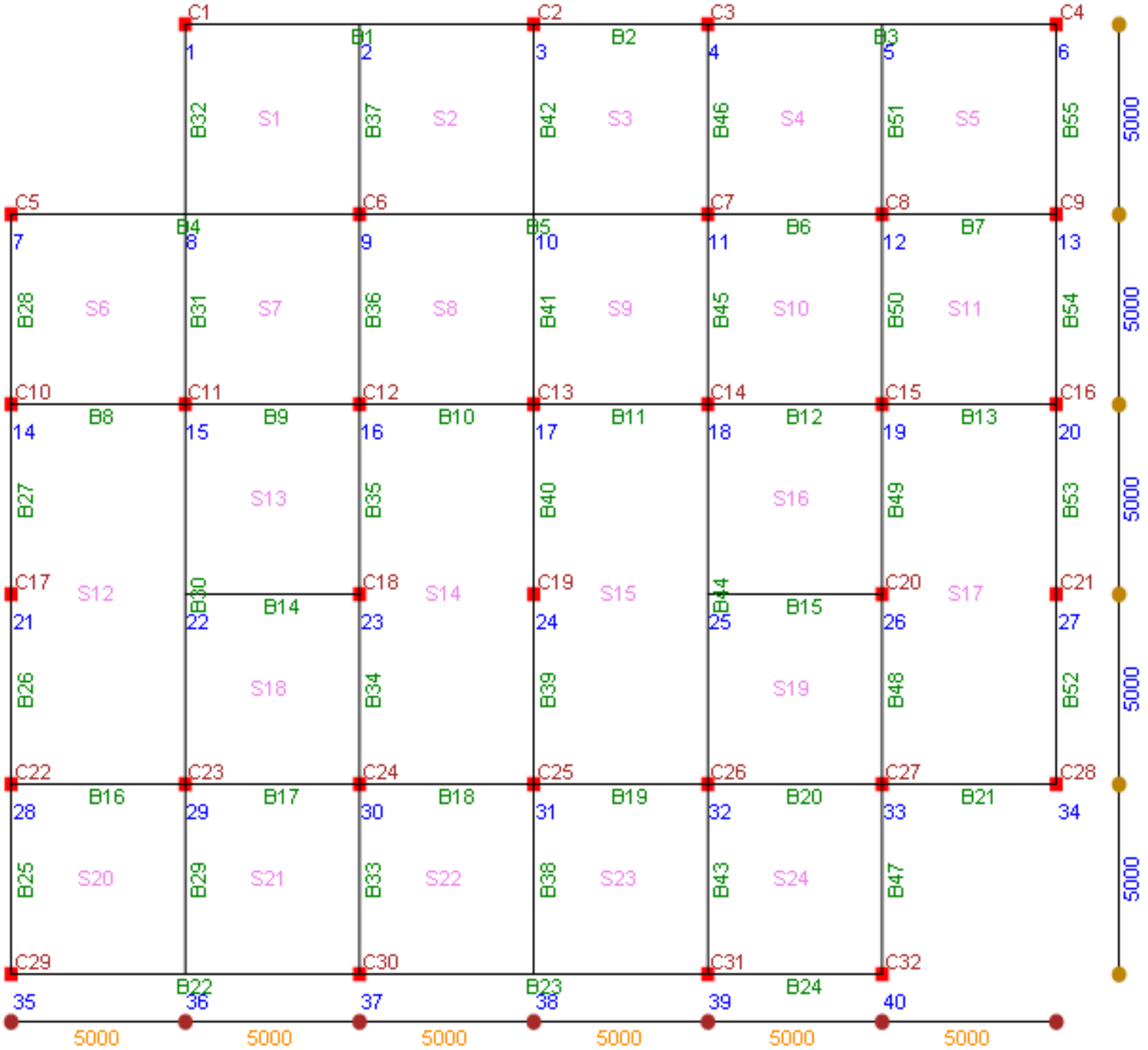


- **Now select " Example _1 File & Press Open Button.**
Following Graphics will be displayed.

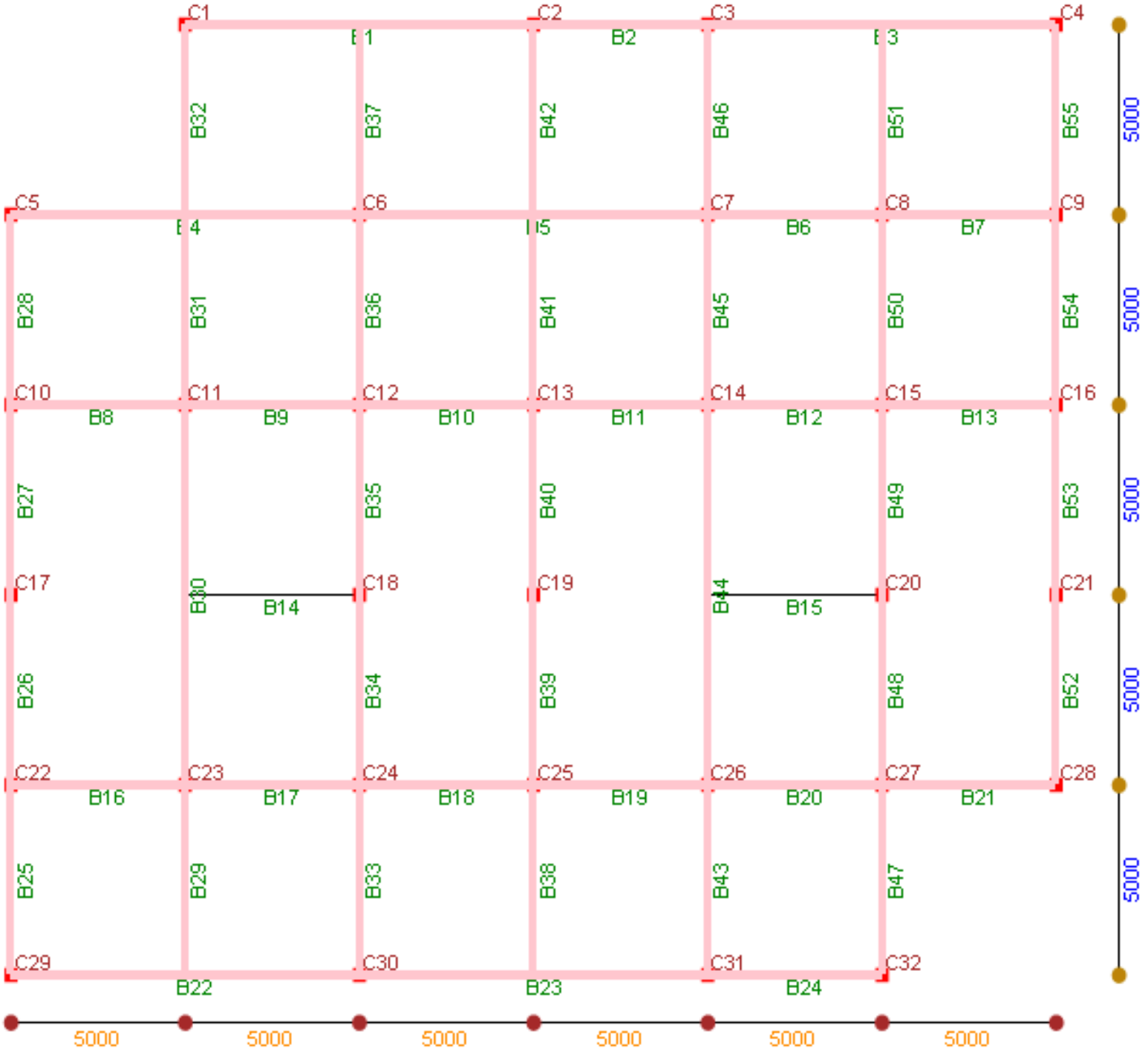


- **The above Graphics displays Joint, Column Numbers as well as Horizontal and Vertical Dimensions.**
  A User should Check the Location of Each Joint & Column & C/C Horizontal & Vertical Grid distance.

- **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.



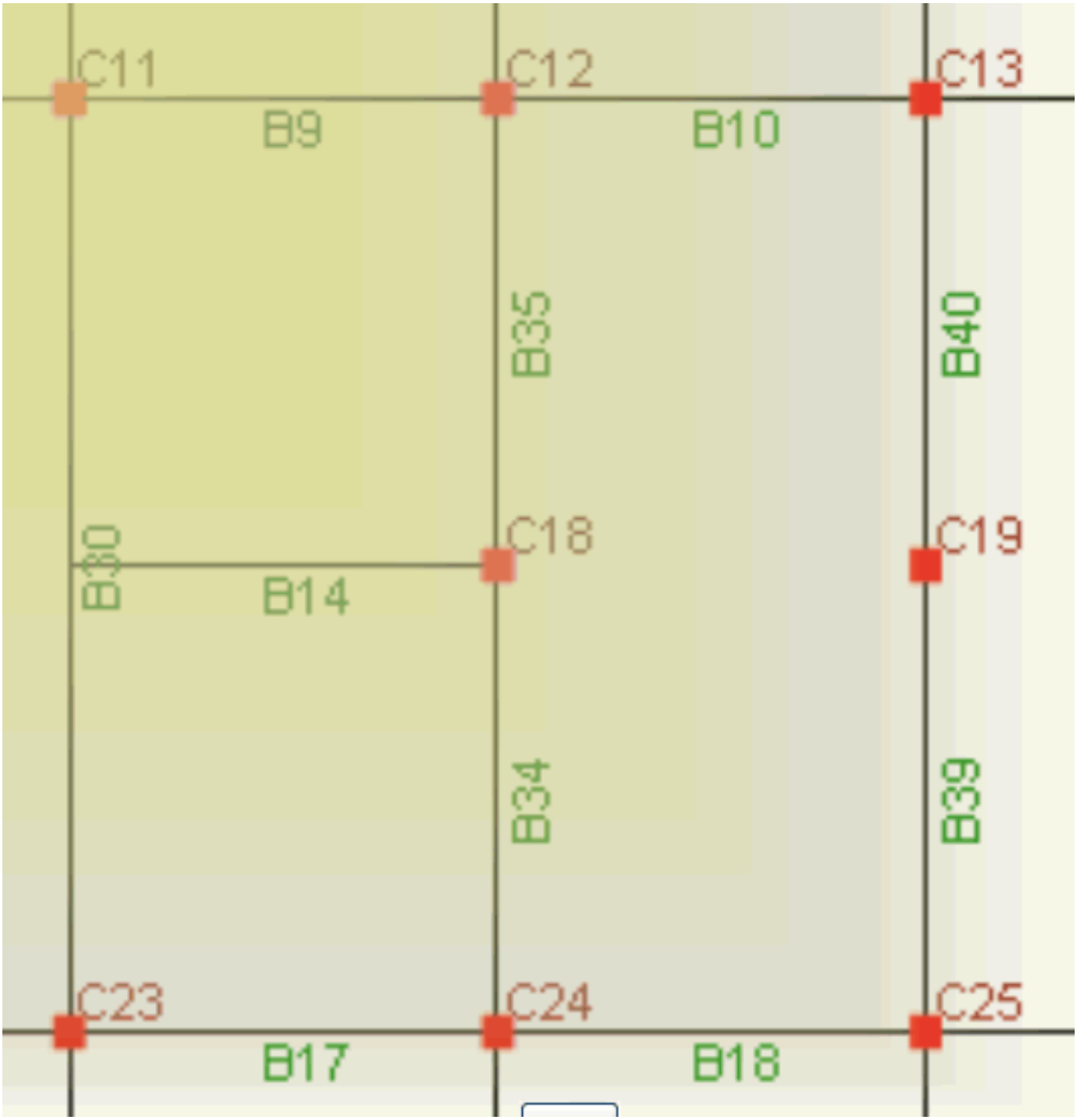
- **Now Click Continuity Button.**
  Following Graphics is displayed.



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.

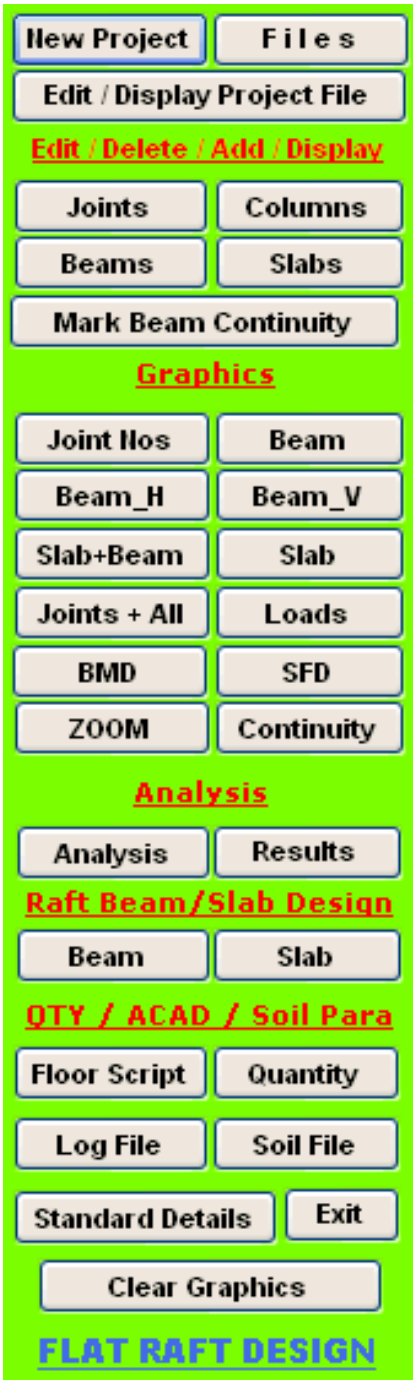
Now we have come to the end of Step # 8.

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

STEP NO. 8 IS OVER.

LEARN FLAT RAFT STEP BY STEP

STEP NO. 9 : Analysis & Its Results + Soil File Option



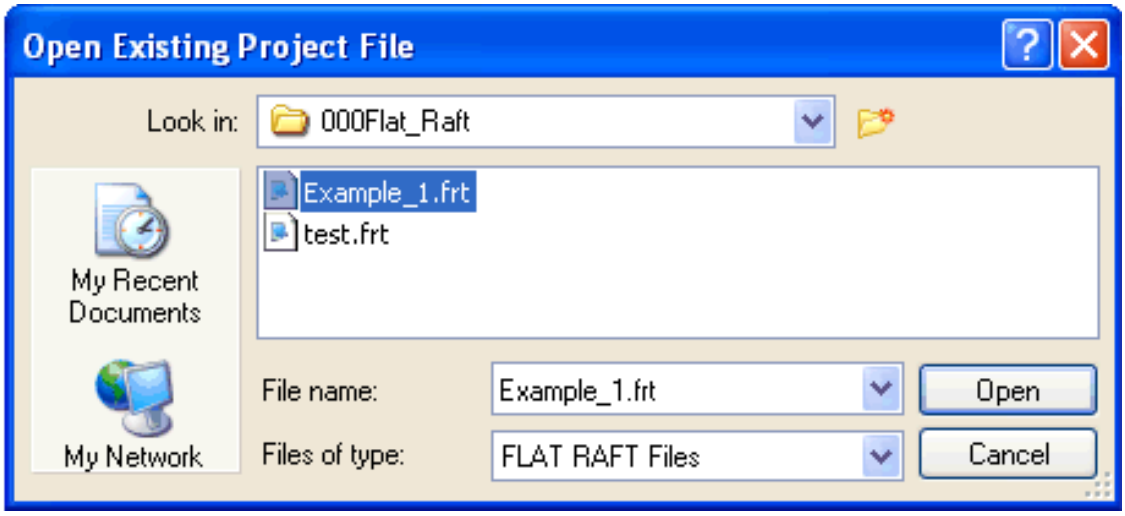
- **After entering Data & Checking it thoroughly, Relax, let the software do its Job. The 1st milestone is Analysis.**

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

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

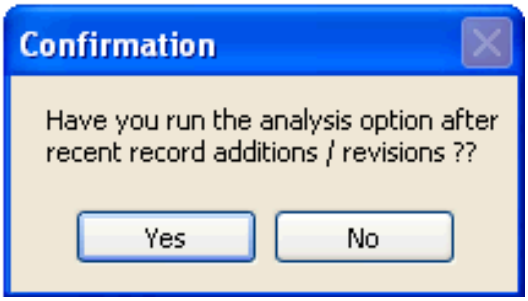
  Now Click on " Analysis " option.

  Following Graphics is displayed.

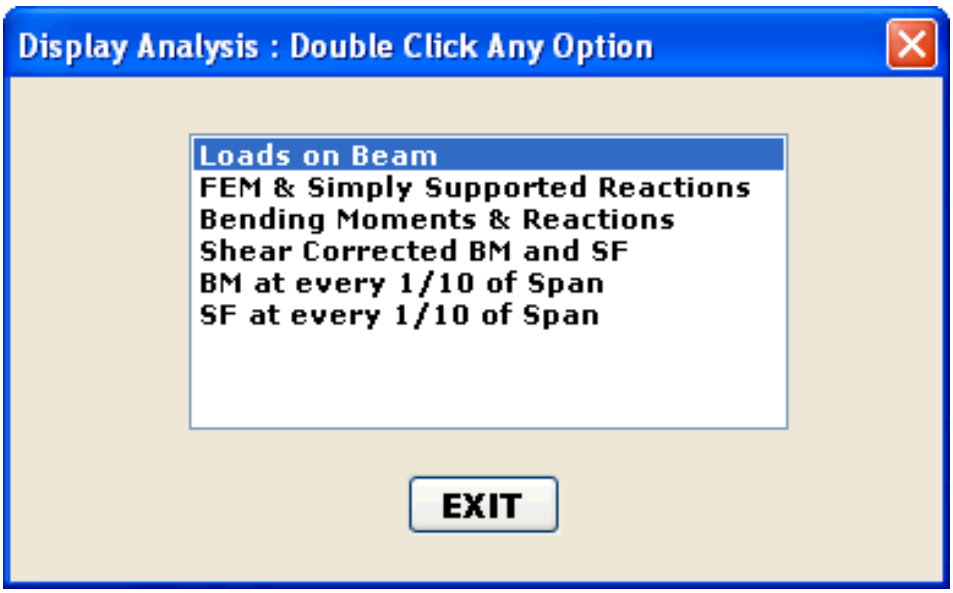


- **Now select " Example _1 File & Press Open Button.**
  The Analysis will commence. A window will open & it will indicate number of Joints, Columns, Beams Slabs to be analyzed. The Analysis will take time & will depend up on the file size & computers RAM memory. Minimum Computer RAM memory of 1 GB 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. RHS_MOM : Right Hand Side Moment is in T-M.
  3. LHS_MOM : Left Hand Side Moment is in T-M.
  4. Point Load is in Ton (Not Used for this Software).
  5. Point Loads are Reaction of Secondary beam.
  6. Dist : is distance of Point Load from Left.
  7. NEAR_INT : is Slab Load in T/M Near to LHS of Beam.
  8. NEAR_DIST : is Slab Load Distance in M Near to LHS.
  9. FAR_INT : is Slab Load in T/M Far from LHS.
  10. FAR_DIST : is Slab Load Distance in M Far from LHS.

- **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.**

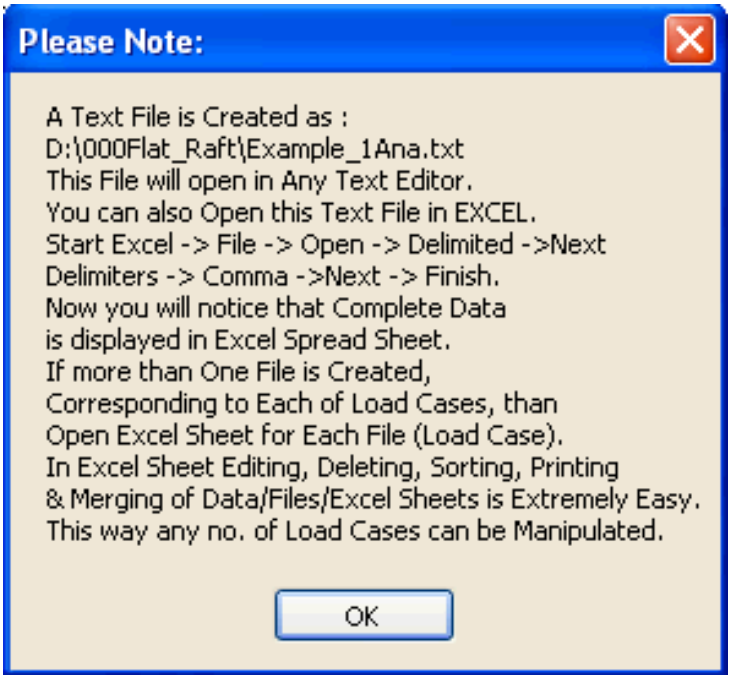
1. LHS Support in T-M.
2. RHS Support in T-M.
3. LHS Reaction in Tons.
4. RHS Reaction in Ton.
5. Span Bending Moment in T-M.
6. Distance of Span BM from LHS Support in M.
7. In order to Sort the Values in Ascending OR
8. Descending Order, Just Click Column Header at Top.

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

RAFT BEAM BENDING MOMENTS AND REACTIONS

Beam #	LHS Supp BM	RHS Supp BM	LHS Reaction	RHS Reaction	Mid Span BM	Dist
1	0	222.7246	101.8351	146.3801	306.4962	5
2	-222.7246	223.7266	40.33546	40.73624	-172.5558	2.5
3	-223.7266	0	146.4803	101.7349	305.9957	5
4	0	610.4669	107.2494	272.3787	333.5677	5
5	-610.4669	289.5514	301.6319	237.4488	467.334	5
6	-289.5514	35.20179	136.9416	35.20179	-17.21442	4
7	-35.20179	0	93.11206	79.03134	90.55156	2.8
8	0	115.1959	106.0683	152.1467	108.8706	2.1
9	-115.1959	74.66461	94.17796	77.96545	13.54197	2.8
10	-74.6646	124.0938	119.2217	138.9933	62.73558	2.4
11	-124.0938	74.49794	139.0267	119.1883	63.03949	2.7
12	-74.49795	115.8625	77.79878	94.34462	13.37539	2.3
13	-115.8625	0	152.28	105.935	108.5839	3
14	0	0	86.0717	86.0717	107.5896	2.5
15	0	0	86.0717	86.0717	107.5896	2.5
16	0	115.7198	105.9635	152.2514	108.6505	2.1
17	-115.7198	75.06892	94.20187	77.94153	13.08502	2.8
18	-75.06891	121.9526	119.7308	138.4842	63.5531	2.4
19	-121.9526	82.65823	136.9664	121.2486	59.61787	2.7
20	-82.65821	85.36258	85.53083	86.61257	23.57924	2.5
21	-85.36258	0	100.6442	66.49918	66.00964	3.1
22	0	326.3587	91.47173	156.7435	254.6794	5
23	-326.3588	150.8094	141.6625	106.5527	179.2745	5
24	-150.8094	0	70.69774	10.37396	3.305835	4.4
25	0	43.42913	31.85003	49.22168	31.27138	2
26	-43.42913	28.95275	43.43113	37.64058	14.73365	2.7
27	-28.95275	43.42913	37.64058	43.43113	14.68734	2.4
28	-43.42913	0	49.22168	31.85003	31.24817	3.1
29	0	280.5015	29.97141	142.172	13.03065	0.9

- **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.
  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 and At Effective Depth from Support Face Respectively.
  3. LHS / RHS Shear Corrected BM in T-M.
  4. LHS Shear Corrected Shear in Tons.
  5. RHS Shear Corrected Shear in Tons.
  6. 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. This display is in two (2) Pages. 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. Un-Factored Bending Moments are in T-M.
  7. In order to Sort the Values in Ascending OR 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. This display is in two (2) Pages. 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. Un-Factored Shear Forces are in T.
  7. In order to Sort the Values in Ascending OR Descending Order, Just Click Column Header at Top.

- **Now Click on Soil File Option, situated near the base of Main Menu. After Analysis this the most important option, as it displays Flat Raft Geometry, Area, Inertia, Bearing Pressures,**
  Raft Stability, Total Loads etc. Following crucial info is displayed.

- **SOIL PRESSURES ON RIGID FLAT RAFT FOUNDATION :**
  ^^
  Max. Flat Raft Dimension Along X-X Axis in MM = 30000
  Max. Flat Raft Dimension Along Y-Y Axis in MM = 25000
  CG of Raft Along X-X Axis in MM = 15000
  CG of Raft Along Y-Y Axis in MM = 12500
  Area of Raft in M2 = 700
  Moment of Inertial of Raft IXX in M4 = 33958.34
  Moment of Inertial of Raft IYY in M4 = 47291.66
  Extreme Fiber Distance Along X-X Axis in M = 15
  Extreme Fiber Distance Along Y-Y Axis in M = 12.5
  CG of Column Loads Along X-X for DL + LL Case (1) in MM = 14862.92
  CG of Column Loads Along Y-Y for DL + LL Case (1) in MM = 12497.75
  CG of Column Loads Along X-X for DL + LL + WL/EQ Case (2) = 14903.75
  CG of Column Loads Along Y-Y for DL + LL + WL/EQ Case (2) = 12497.47
  CG of Column Loads Along X-X for DL + LL + WL/EQ Case (3) = 14815.05
  CG of Column Loads Along Y-Y for DL + LL + WL/EQ Case (3) = 12448.98
  Column Load on Raft in Ton (DL + LL) = 4450
  Column Load on Raft in Ton (DL + LL + WL/EQ : X_X) = 4935
  Column Load on Raft in Ton (DL + LL + WL/EQ : Y_Y) = 3920
  Weight of Raft Slab in Ton = 1750
  Total Additional UDL on Raft Beams in Tons = 105
  Weight of Soil in Ton = 1764

Wt. of Grade/Basement Slab + FF + LL + Partition = 476
Total Grade Weight Acting on CG of Raft = 4095
Upward Thrust of Water in Ton = 0
Total Vertical Load on Raft in Ton (DL + LL) = 8545
Total Vertical Load on Raft (DL + LL + WL/EQ : X_X) = 9030
Total Vertical Load on Raft (DL + LL + WL/EQ : Y_Y) = 8015
BM @ X_X in T-M (DL + LL) = 1171.341
BM @ Y_Y in T-M (DL + LL) = 19.20122
BM @ X_X in T-M (DL + LL + WL/EQ : X_X) = 869.1463
BM @ Y_Y in T-M (DL + LL + WL/EQ : X_X) = 22.87482
BM @ X_X in T-M (DL + LL + WL/EQ : Y_Y) = 1482.368
BM @ Y_Y in T-M (DL + LL + WL/EQ : Y_Y) = 408.9294
Lateral Frictional Resistance of Foundation in Ton = 3418
Maximum Gross Soil Pressure Under DL + LL in T/M2 = 12.58574
Minimum Gross Soil Pressure in T/M2 = 9.328548
Maximum Gross Soil Pressure Under DL + LL + WL/EQ - X_X in T/M2 = 13.1841
Maximum Gross Soil Pressure Under DL + LL + WL/EQ - Y_Y in T/M2 = 12.0707
Net Design Pressure on Raft in T/M2 = 6.885737
Max. Permissible Column Spacing in M along X-X Dir (Rigidity Consideration) = 16.44
Max. Permissible Column Spacing in M along Y-Y Dir (Rigidity Consideration) = 16.67
Notes : Extend Raft Slab at least 300 MM from Beam / Column Face.
All Column Loads Shall be Design Loads, i.e. Without Load Factor.
Design Pressure is Reduced by 0.80 Factor Under DL + LL + WL/EQ Condition.
Minimum of .2 % of Reinforcement is Provided in Hidden Raft Beams.
Provide a minimum of 40 MM Blinding Layer (PCC) below RC Raft Slab.
40 MM thick Blinding Layer (PCC) Shall be atleast of M 7.5 Grade.
Refer IS 2950:Part/1/1981 For Rigid Raft Design/Col. Spacing/Relative Stiffness Factor.

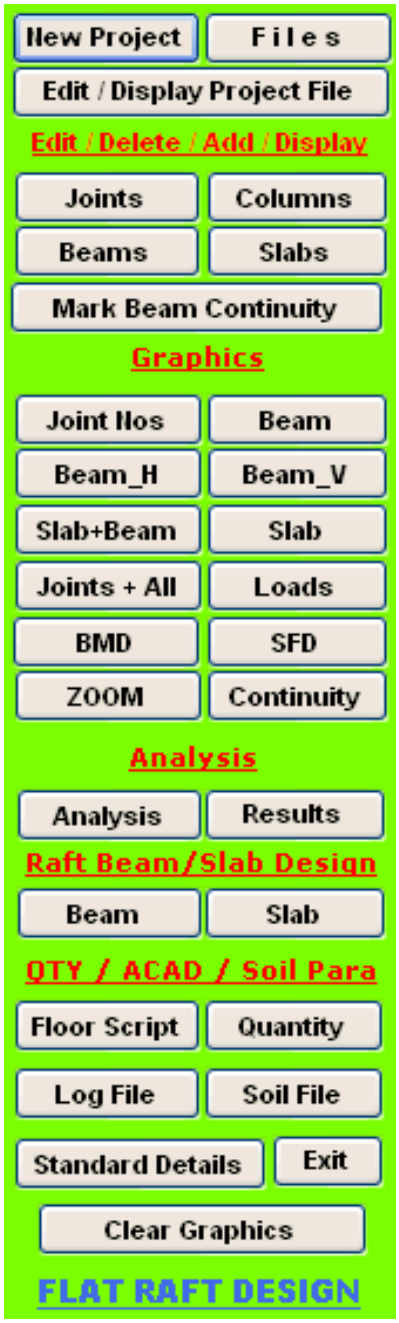
- **Now we have come to the end of Step # 9.**
  In the next step we will Run " Beam Design " Option.

STEP NO. 9 IS OVER.

LEARN FLAT RAFT STEP BY STEP

STEP NO. 10

Flat Raft Beam & Slab Design, Quantities & Cost Estimation

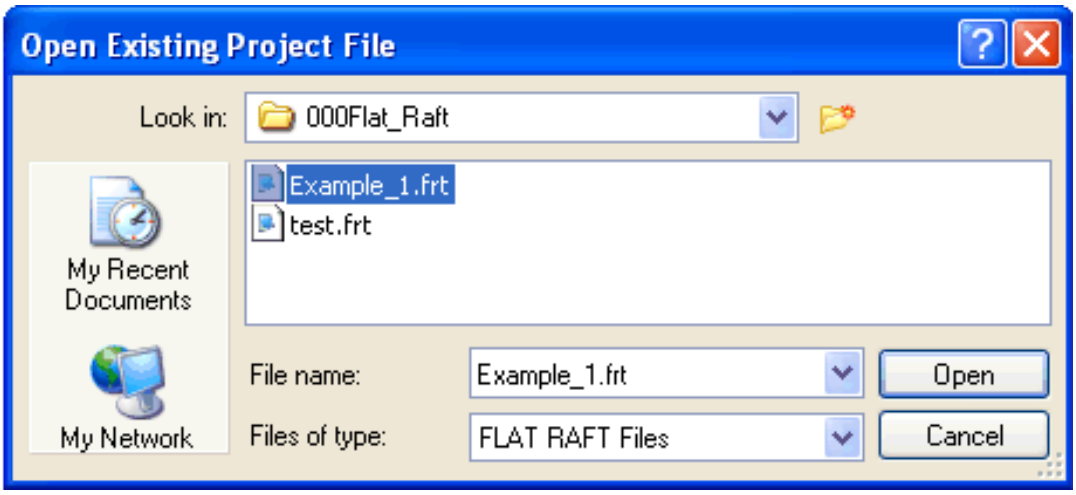


When Program starts, the Menu above is displayed. Under the Raft Beam / Slab Design Heading following options are displayed.

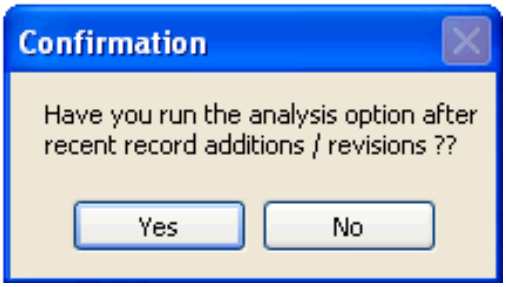
- **Beam**
- **Slab**
- **Quantity**
- **Floor Script for AutoCAD Drawing**
- **Soil File**

Now Click on " Beam " Option.

Following Graphics is displayed.



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

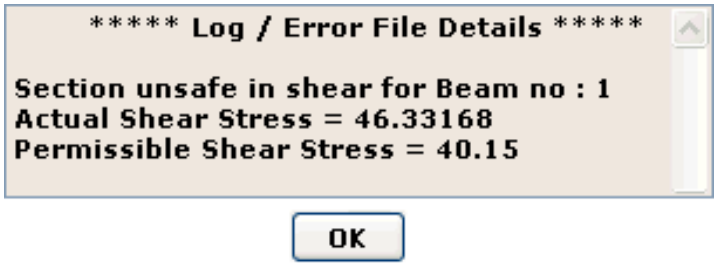


- **This is a very Important Message. In case a user has edited or added any Joint / Column / Beam**
  or Slab Member after performing analysis then he should re-perform the analysis, else old (in-correct) results will be displayed.
  Now run Beam Design. Following Beam Schedule will be displayed.

HIDDEN BEAM REINFORCEMENT SCHEDULE

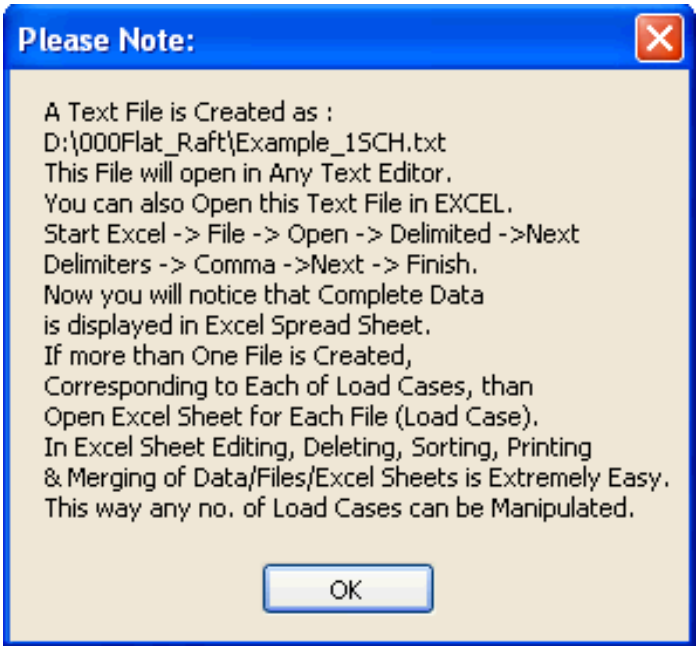
No.	Width	Depth	Top Steel	Bottom Steel	Stirrups
1	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
2	1250	1000	36 T 16	36 T 16	d 6 @ 495 - 4 Legged
3	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
4	2500	1000	44 T 20	26 T 16	T 8 @ 325 - 8 Legged
5	2500	1000	41 T 25	26 T 16	T 10 @ 170 - 8 Legged
6	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
7	1250	1000	39 T 12	24 T 12	d 6 @ 600 - 4 Legged
8	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
9	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
10	1250	1000	24 T 12	24 T 12	d 6 @ 600 - 4 Legged
11	1250	1000	23 T 12	24 T 12	d 6 @ 600 - 4 Legged
12	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
13	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
14	1250	1000	25 T 16	24 T 12	d 6 @ 600 - 4 Legged
15	1250	1000	25 T 16	24 T 12	d 6 @ 600 - 4 Legged
16	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
17	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
18	1250	1000	23 T 12	24 T 12	d 6 @ 600 - 4 Legged
19	1250	1000	24 T 12	24 T 12	d 6 @ 600 - 4 Legged
20	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
21	1250	1000	35 T 12	24 T 12	d 6 @ 495 - 4 Legged
22	1250	1000	55 T 16	24 T 12	T 8 @ 155 - 4 Legged
23	1250	1000	38 T 16	24 T 12	T 10 @ 190 - 4 Legged
24	1250	1000	34 T 12	24 T 12	d 6 @ 495 - 4 Legged
25	1250	1000	34 T 12	24 T 12	d 6 @ 600 - 4 Legged

- **Note that in the Beam Schedule if " Error : See Log File " is displayed for Say Beam no. B1, then user shall Click the " Log File " Button (Situated near the End of menu). Following window with the Error Detail will be displayed.**



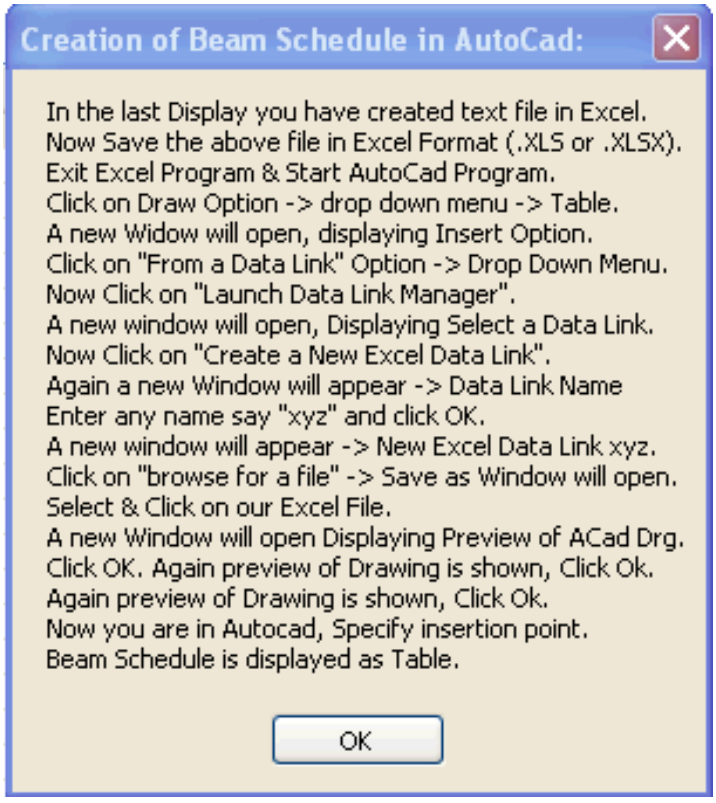
- **The error message is clear, Beam No. 1 is Un-safe in Shear.
Change the beam thickness using Edit Project option. Now Re-Run the Analysis File.
After analysis is over, again perform Beam Design, till you will find that there is no error in Beam Schedule.**

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.

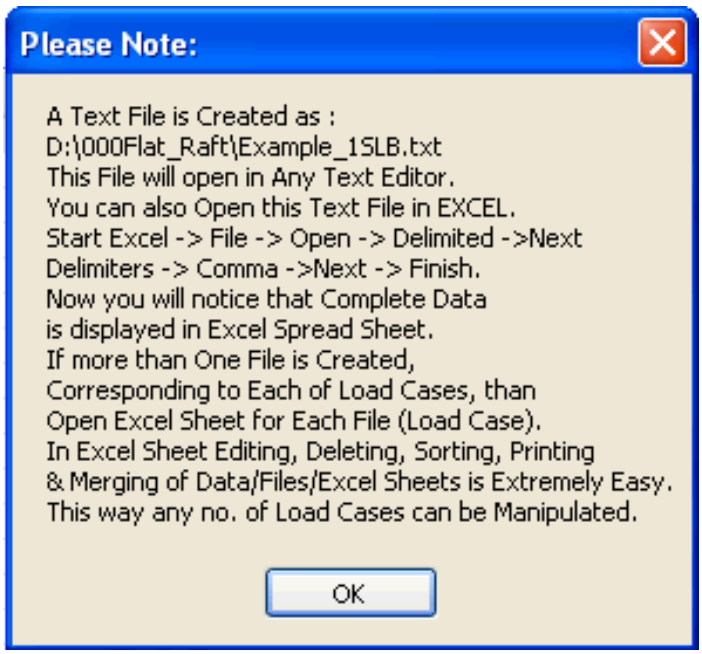


- **For Detail explanation refer step no. 13.**
  Now Consider " Slab " Option. Run Slab Design option.
  Following Graphics is displayed.

SLAB REINFORCEMENT SCHEDULE

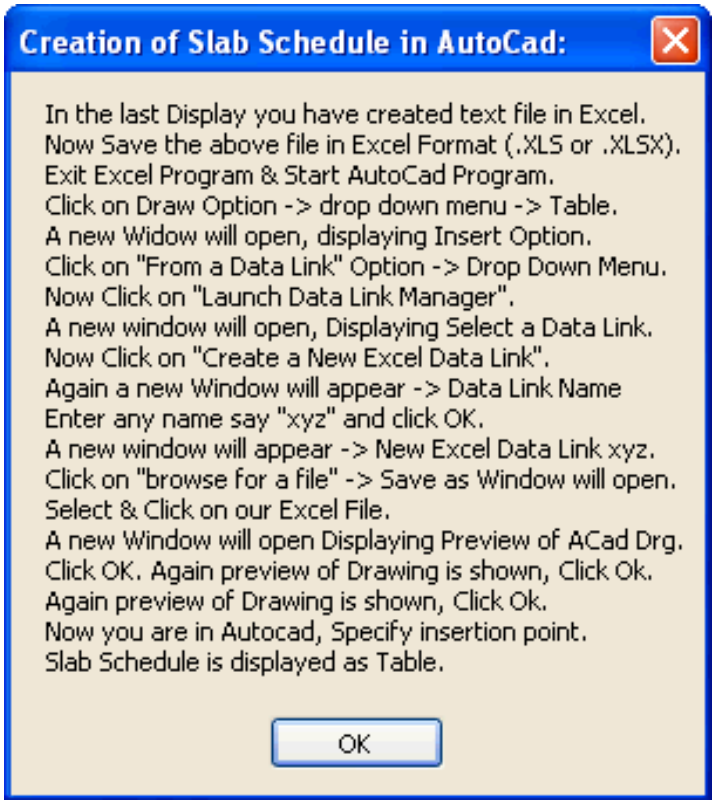
No.	Thickness	Shorter Top & Bottom Steel	Longer Top & Bottom Steel
S1	1000	T 16 @ 155	T 16 @ 155
S2	1000	T 16 @ 155	T 16 @ 155
S3	1000	T 16 @ 155	T 16 @ 155
S4	1000	T 16 @ 155	T 16 @ 155
S5	1000	T 16 @ 155	T 16 @ 155
S6	1000	T 16 @ 155	T 16 @ 155
S7	1000	T 16 @ 155	T 16 @ 155
S8	1000	T 16 @ 155	T 16 @ 155
S9	1000	T 16 @ 155	T 16 @ 155
S10	1000	T 16 @ 155	T 16 @ 155
S11	1000	T 16 @ 155	T 16 @ 155
S12	1000	T 16 @ 155	T 16 @ 150
S13	1000	T 16 @ 155	T 16 @ 155
S14	1000	T 16 @ 155	T 16 @ 150
S15	1000	T 16 @ 155	T 16 @ 150
S16	1000	T 16 @ 155	T 16 @ 155
S17	1000	T 16 @ 155	T 16 @ 150
S18	1000	T 16 @ 155	T 16 @ 155
S19	1000	T 16 @ 155	T 16 @ 155
S20	1000	T 16 @ 155	T 16 @ 155
S21	1000	T 16 @ 155	T 16 @ 155
S22	1000	T 16 @ 155	T 16 @ 155
S23	1000	T 16 @ 155	T 16 @ 155
S24	1000	T 16 @ 155	T 16 @ 155

- **Note that in the Slab Schedule if " Error : See Log File " is displayed for any Slab, then user shall open the Log File for error details & take corrective steps (Change of Flat Raft Thickness / Concrete Grade / Column Size / Re-Framing, followed by Analysis, Beam design & Slab design) till no errors are found.**
- **When " OK " button is clicked, following Important Message is displayed.**



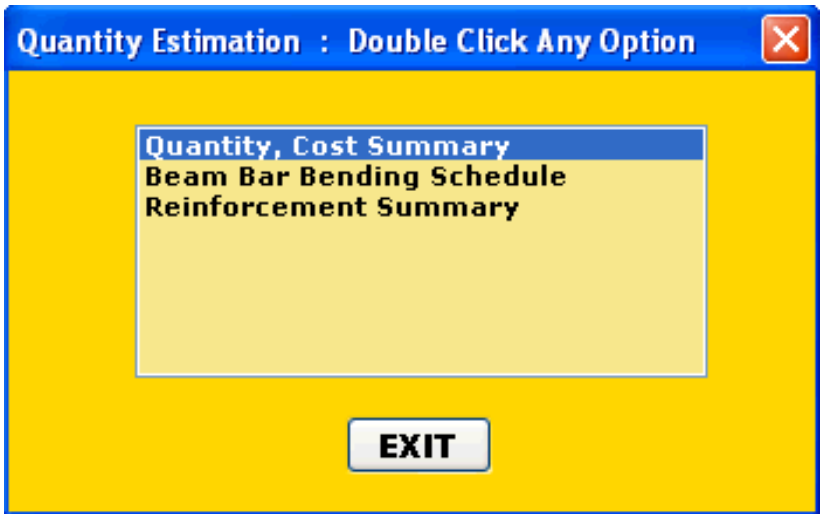
- **The above message describes how any number of Load Cases can be Run & Manipulated once the File is Exported to Excel Spread Sheet. Note the File Name Carefully.**

  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.
  Following Graphics is displayed.



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

RAFT QUANTITIES AND COST SUMMARY

Item	Quantity	Rate	Cost
M35 Concrete in M3	700	8000	5600000
Total Reinforcement in Tons	67.48374	60000	4049025
PCC Flooring + FF (Raft Area in M2)	700	320	224000
Excavation & Re-Filling	980	150	147000
Total Cost of Raft			10020024
Unit Cost of Raft in Rs / M2			14314.32
Unit Cost of Raft in Rs / sqft			1331.565
Total Cement Bags Required in Nos.	8736		
Total Sand Consumption in M3	296		
Total Aggregate Required in M3	581		

- **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.

APPROXIMATE BEAM BAR BENDING SCHEDULE

Beam #	Description	Code	Nos	Dia	Dim_A	Dim_B	Length	Quantity
1	B1-Top steel->st	1	44	20	11.32		11.32	1227.717
1	B1-Btm steel->st	1	24	12	10.792		10.792	229.8344
1	B1-Stirrups	8	168	10	0.95	0.3	2.74	283.6607
2	B2-Top steel->st	1	36	16	6.056		6.056	343.9281
2	B2-Btm steel->st	1	36	16	6.056		6.056	343.9281
2	B2-Stirrups	8	40	6	0.95	0.3	2.644	23.4619
3	B3-Top steel->st	1	44	20	11.32		11.32	1227.717
3	B3-Btm steel->st	1	24	12	10.792		10.792	229.8344
3	B3-Stirrups	8	168	10	0.95	0.3	2.74	283.6607
4	B4-Top steel->st	1	44	20	11.32		11.32	1227.717
4	B4-Btm steel->st	1	26	16	11.056		11.056	453.4722
4	B4-Stirrups	8	240	8	0.95	0.3	2.692	254.8036
5	B5-Top steel->st	1	41	25	11.65		11.65	1839.624
5	B5-Btm steel->st	1	26	16	11.056		11.056	453.4722
5	B5-Stirrups	8	448	10	0.95	0.3	2.74	756.4285
6	B6-Top steel->st	1	24	12	5.792		5.792	123.3507
6	B6-Btm steel->st	1	24	12	5.792		5.792	123.3507
6	B6-Stirrups	8	116	8	0.95	0.3	2.692	123.1551
7	B7-Top steel->st	1	39	12	5.792		5.792	200.4449
7	B7-Btm steel->st	1	24	12	5.792		5.792	123.3507
7	B7-Stirrups	8	32	6	0.95	0.3	2.644	18.76952
8	B8-Top steel->st	1	24	16	6.056		6.056	229.2854
8	B8-Btm steel->st	1	24	12	5.792		5.792	123.3507
8	B8-Stirrups	8	32	6	0.95	0.3	2.644	18.76952
9	B9-Top steel->st	1	24	12	5.792		5.792	123.3507
9	B9-Btm steel->st	1	24	12	5.792		5.792	123.3507
9	B9-Stirrups	8	116	8	0.95	0.3	2.692	123.1551
10	B10-Top steel->st	1	24	12	5.792		5.792	123.3507
10	B10-Btm steel->st	1	24	12	5.792		5.792	123.3507

- **BBS is approximate, do not use cutting length for fabrication.**

Now Double Click " Reinforcement Summary " Option. Following Graphics is displayed.

APPROXIMATE SUMMARY OF REINFORCEMENTS IN KG

6 MM Dia :	720.2806
8 MM Dia :	2327.207
10 MM Dia :	1661.441
12 MM Dia :	13348.62
16 MM Dia :	41141.02
20 MM Dia :	6445.516
25 MM Dia :	1839.624
32 MM Dia :	0

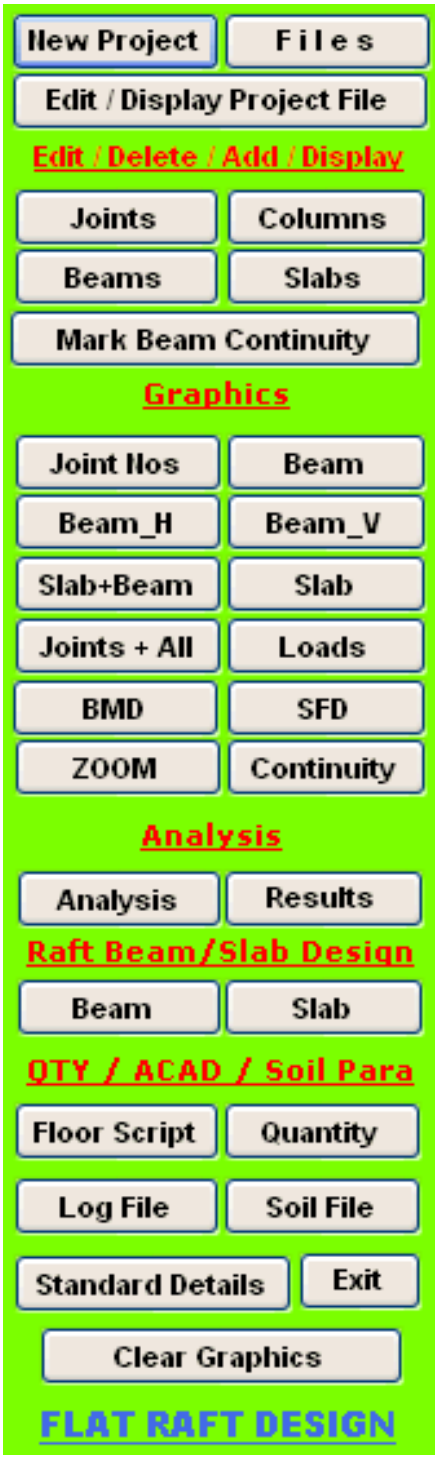
TOTAL REINFORCEMENT IN TONS = 67.48371

- **The MTO includes total of Beam and Slab steel Quantities. Beam steel quantities are taken from Approx. BBS and Slab quantities have been worked out approximately from Slab Schedule.**
- **Now we have come to the end of Step # 10.**
  Let us proceed to Step No. 11.

STEP NO. 10 IS OVER.

LEARN FLAT RAFT STEP BY STEP

STEP NO. 11 : BENDING MOMENT, SHEAR FORCE DIAGRAM LOAD DISPLAY AND FILES OPTION

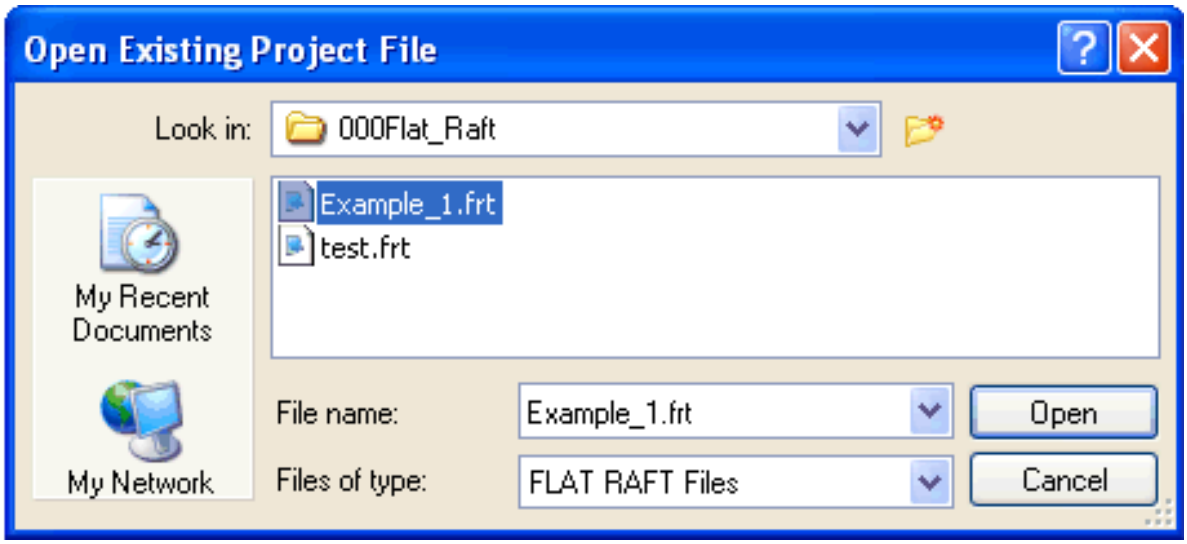


When Program starts, the Menu above is displayed. Under the Graphics Heading following options are displayed.

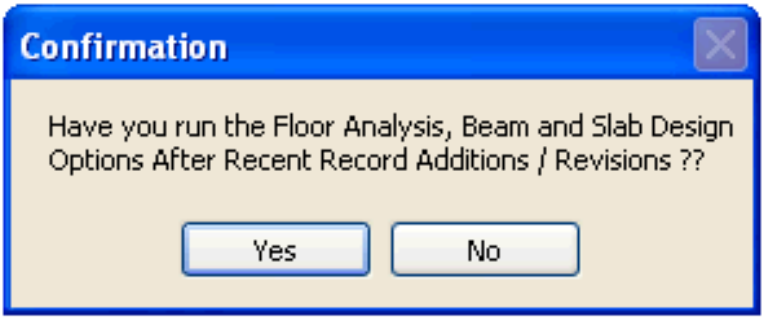
- **Joint Nos**
- **Beam**
- **Beam_H (Only Horizontal Beam # will be Displayed).**
- **Beam_V (Only Vertical Beam # will be Displayed).**
- **Slab + Beam (Beams, Slabs & Columns are displayed).**
- **Slab (Only Slabs & Columns are displayed).**
- **Joints + ALL (For Display of Joints, Columns, Beams & 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.

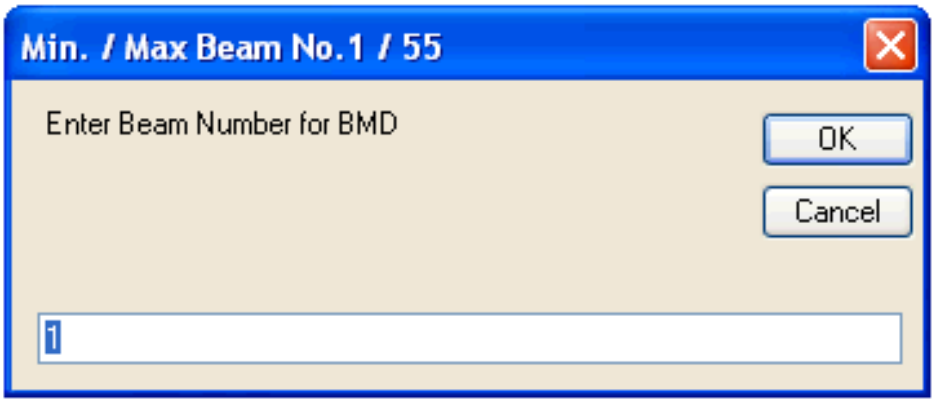
Following Graphics is displayed.



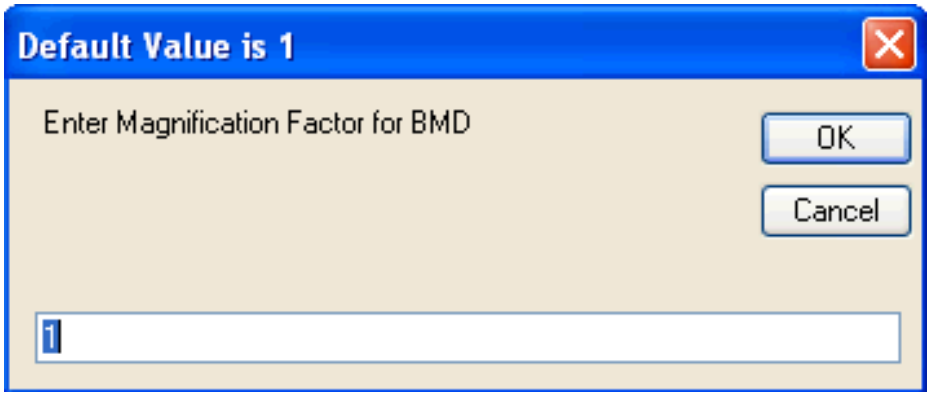
- **Now select " Example _1 File & Press Open Button. Following Warning is displayed.**



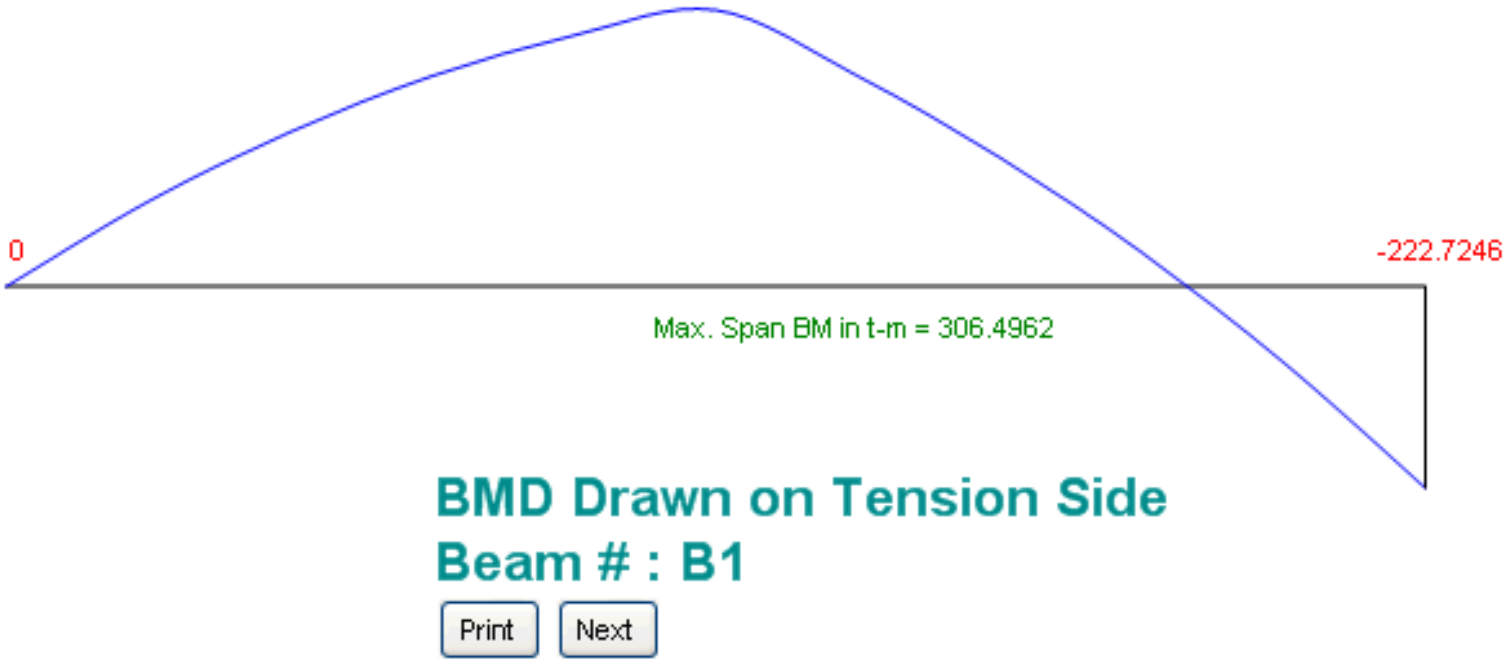
- **This is a very Important Message. In case a user has edited or added any Joint / Column / Beam or Slab Member after performing analysis then he should re-perform the analysis, else old (in-correct) results will be displayed. The Beam and Slab Designs are equally important as these options inform 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. Click OK.**
  Following BMD is displayed.



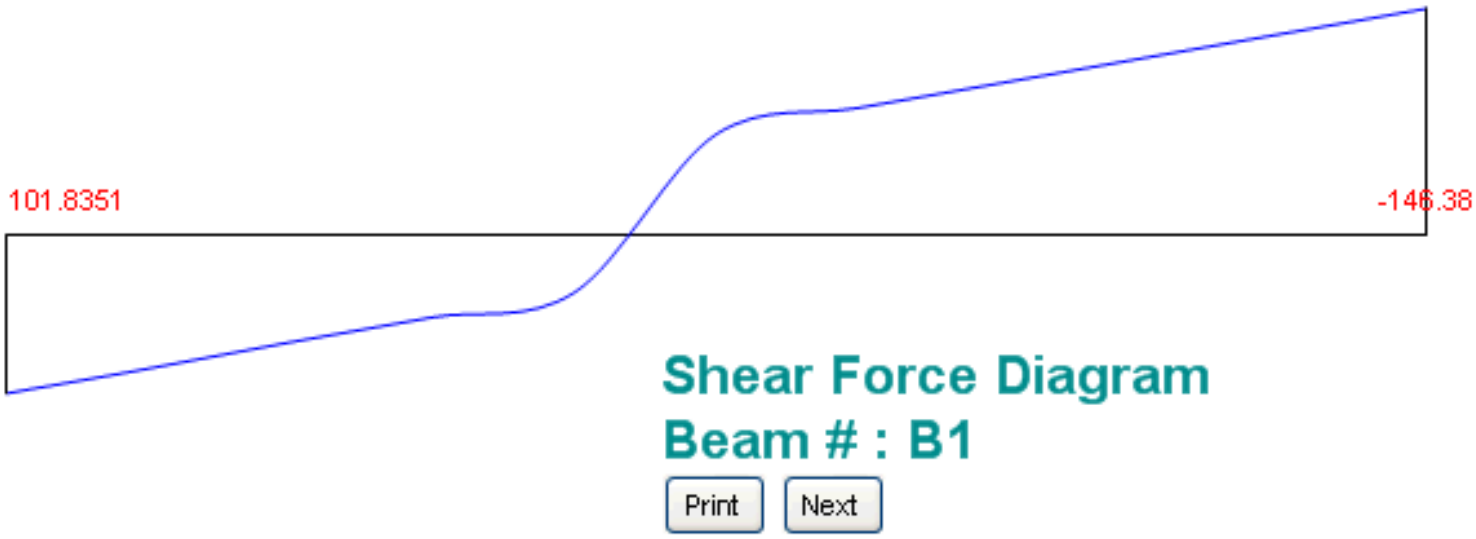
- **Note that BMD is drawn on Tension Side which reflects Deflected shape of Beam. BMD, SFD and Load Diagrams are Important from the point of Checking Results & Data Input. Any un-expected Diagram will reflect Data Error in the form of :**

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

  The 3 Cases are displayed simultaneously.
  The " Next " button is very useful as it can help you to display continuously the required BMD for a specified Beam.

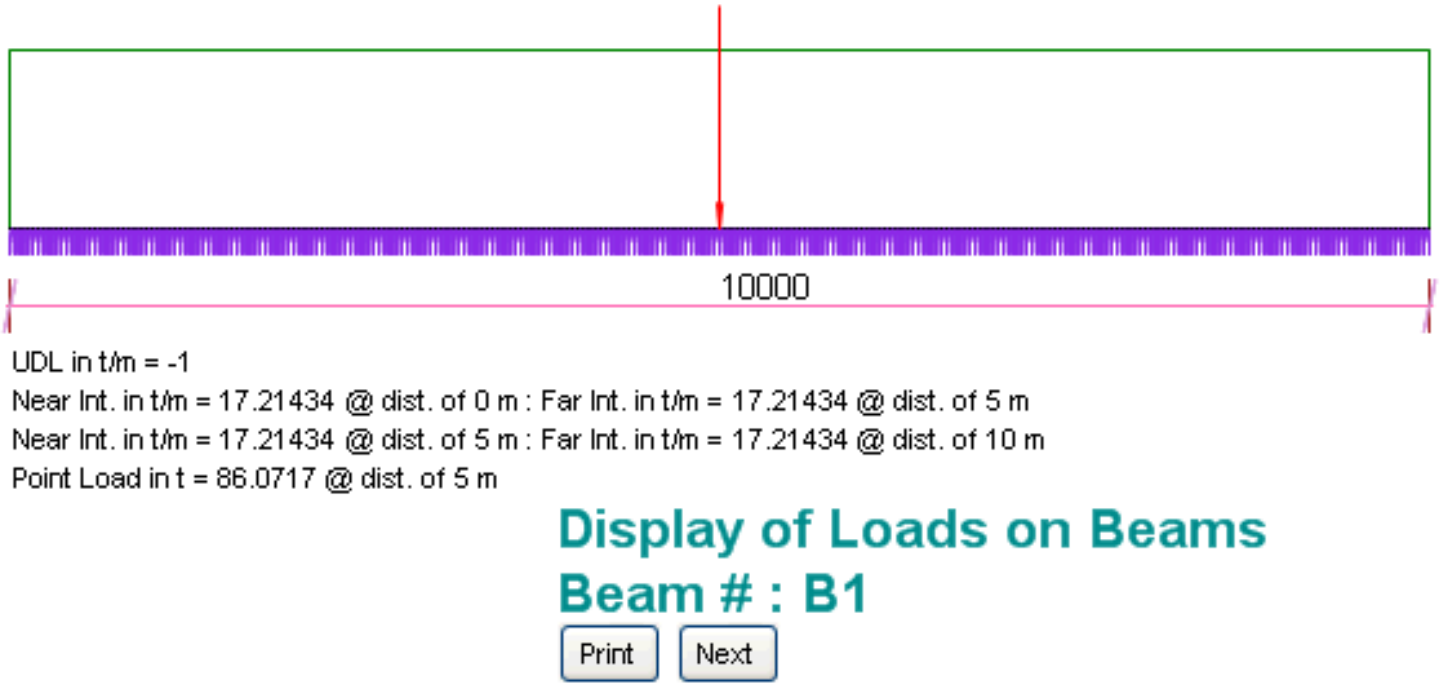
  Now Click on " SFD " option. The procedure is exactly same as that of BMD.

  SFD is displayed as under. MF = 1.0

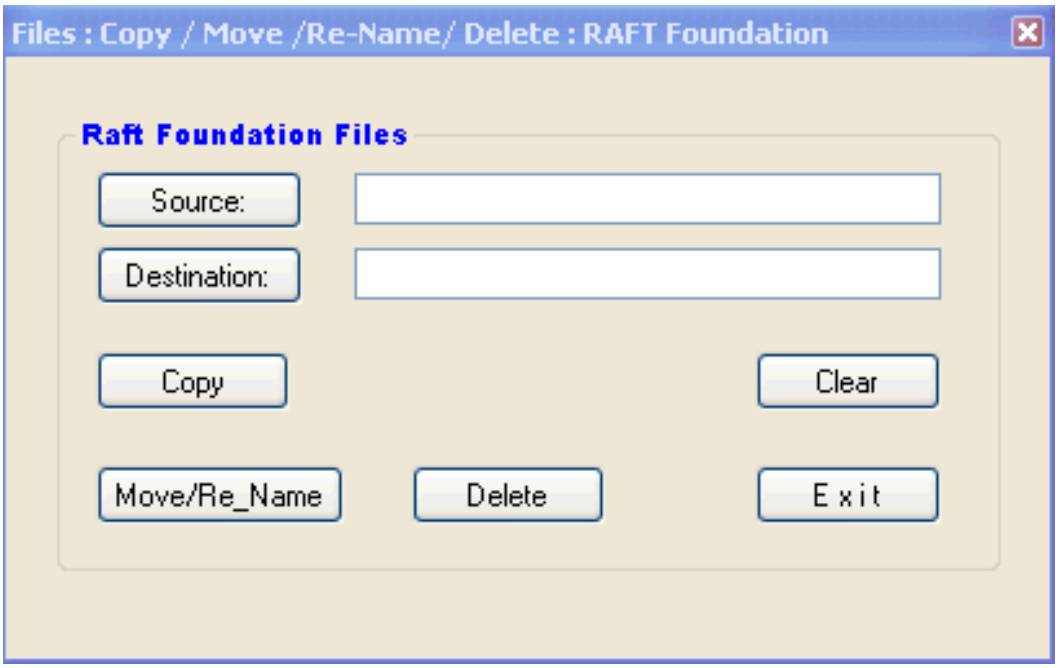


- **Now Click " Loads " button. The procedure is exactly same as that of BMD / SFD.**

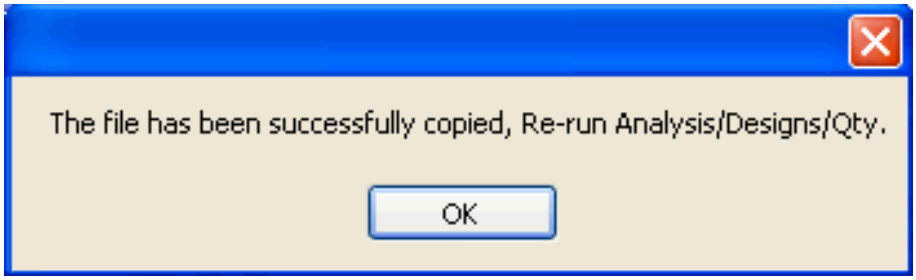
  Load Diagram is displayed as under. Read the Diagram upside down.



- **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.



- **Use this 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.

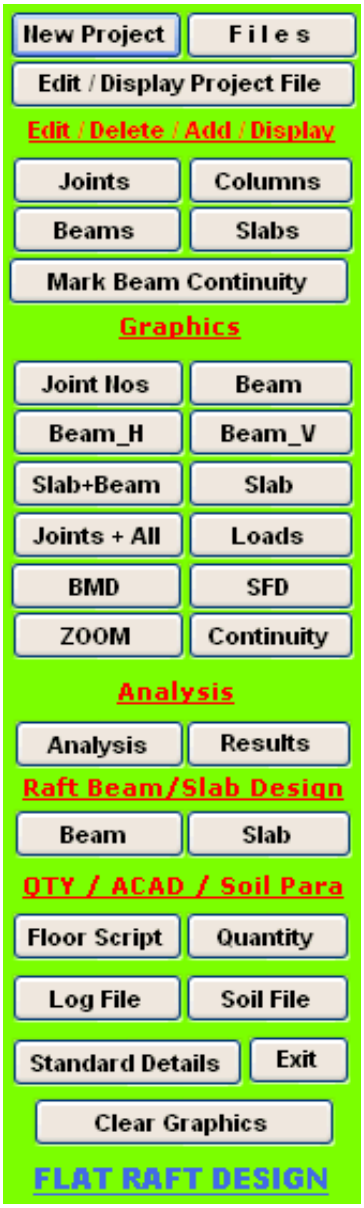
Note that FLAT Raft Foundation File extension is " .FRT ".

Now we have come to the end of Step # 11.

STEP NO. 11 IS OVER.

LEARN FLAT RAFT STEP BY STEP

STEP 12 : CREATION OF RAFT FOUNDATION PLAN IN AUTOCAD

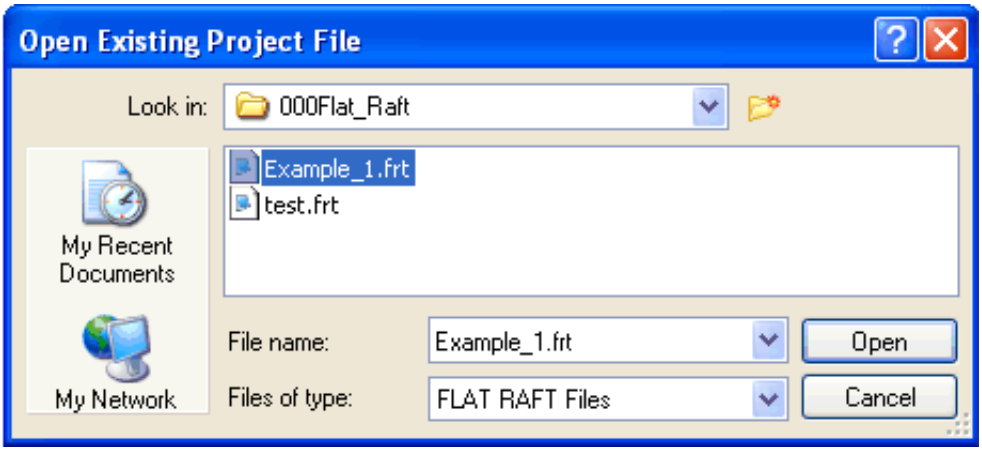


When The Program starts, the above Menu is displayed.

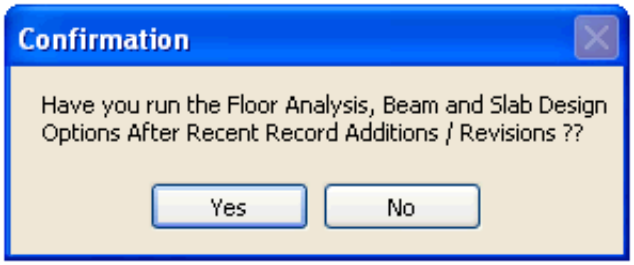
➤ Under the **QTY / ACAD / Soil Para** heading following options are displayed.

- Floor Script
- Quantity
- Log File
- Soil File
- Standard Details
- Exit
- Clear Graphics

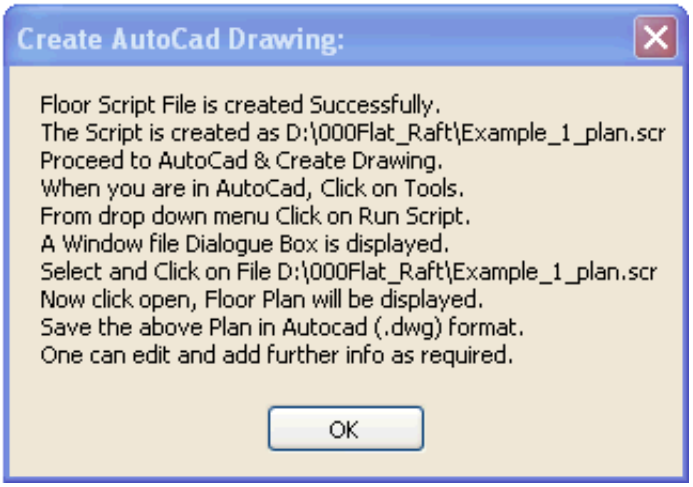
In Order to create an AutoCAD drawing, a script file has to be created first.
To create the script file, click on Floor Script Option. A window dialogue box appears .
Click on the required file and click on open.



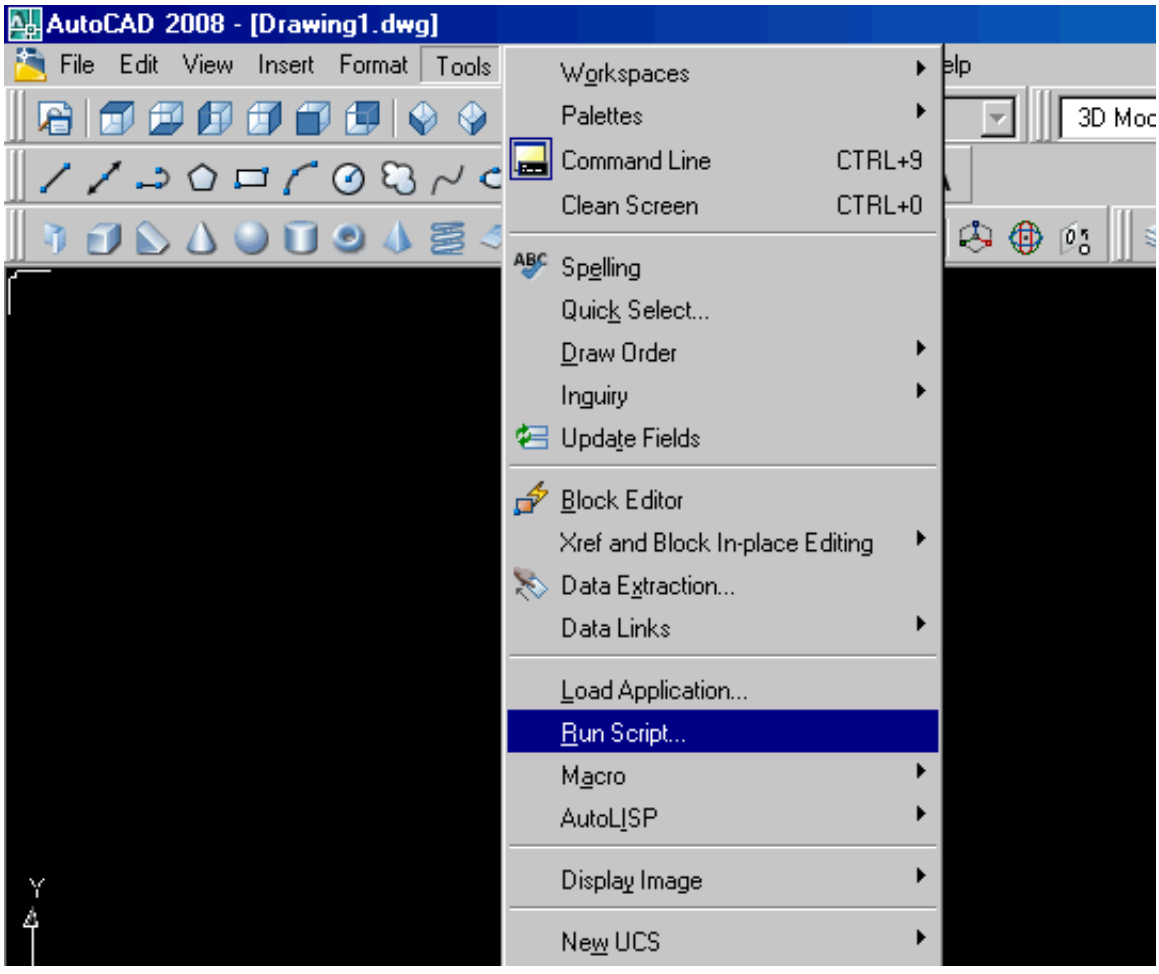
➤ Following graphics is displayed.
Click on Yes if Floor Analysis and Beam Design Options are performed.



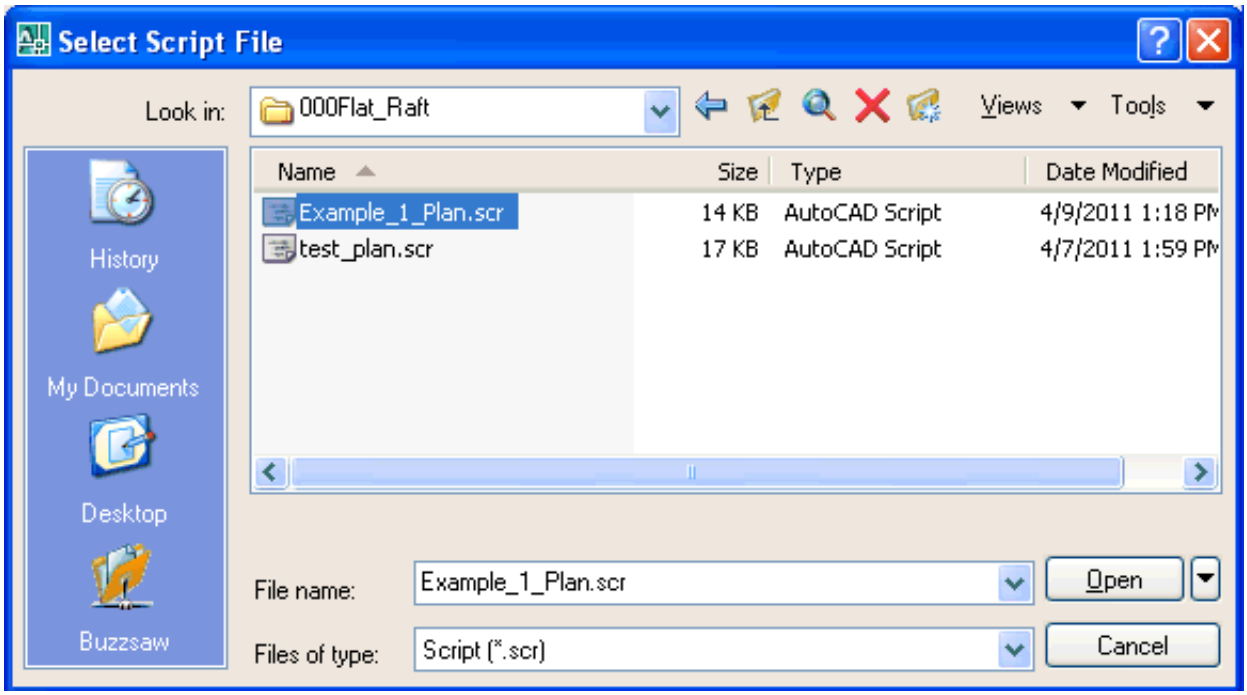
Once Yes is clicked, following graphics is displayed.
➤ The script file is created as Example_1_plan.scr. Note that "_plan" is added to file name and that .scr stands for script file and not screen saver file.
Now click on OK and Exit from the Program.



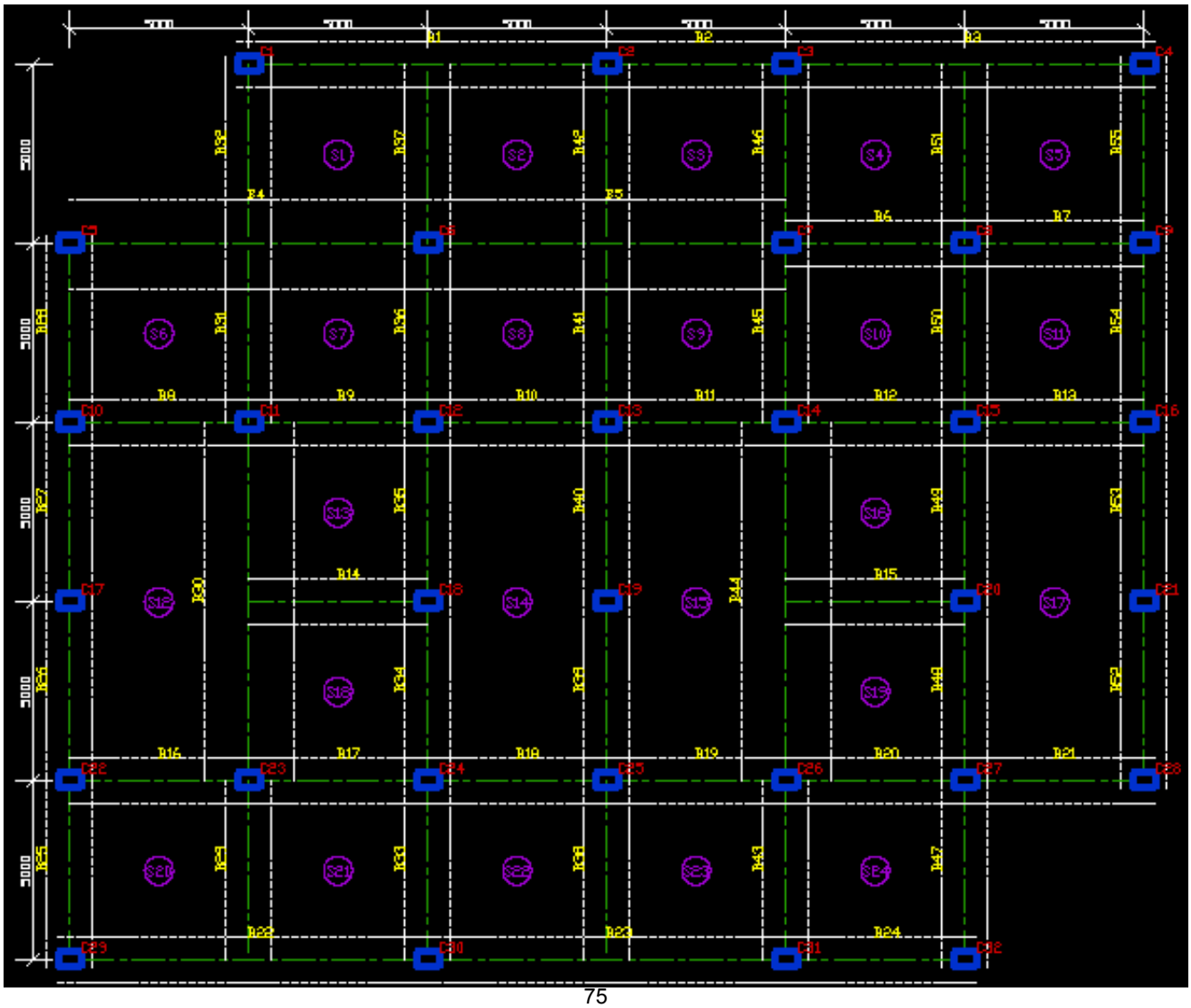
➤ Now Start AutoCAD.
In AutoCAD click on Tools. From the drop down menu click on Run Script.



➤ 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.

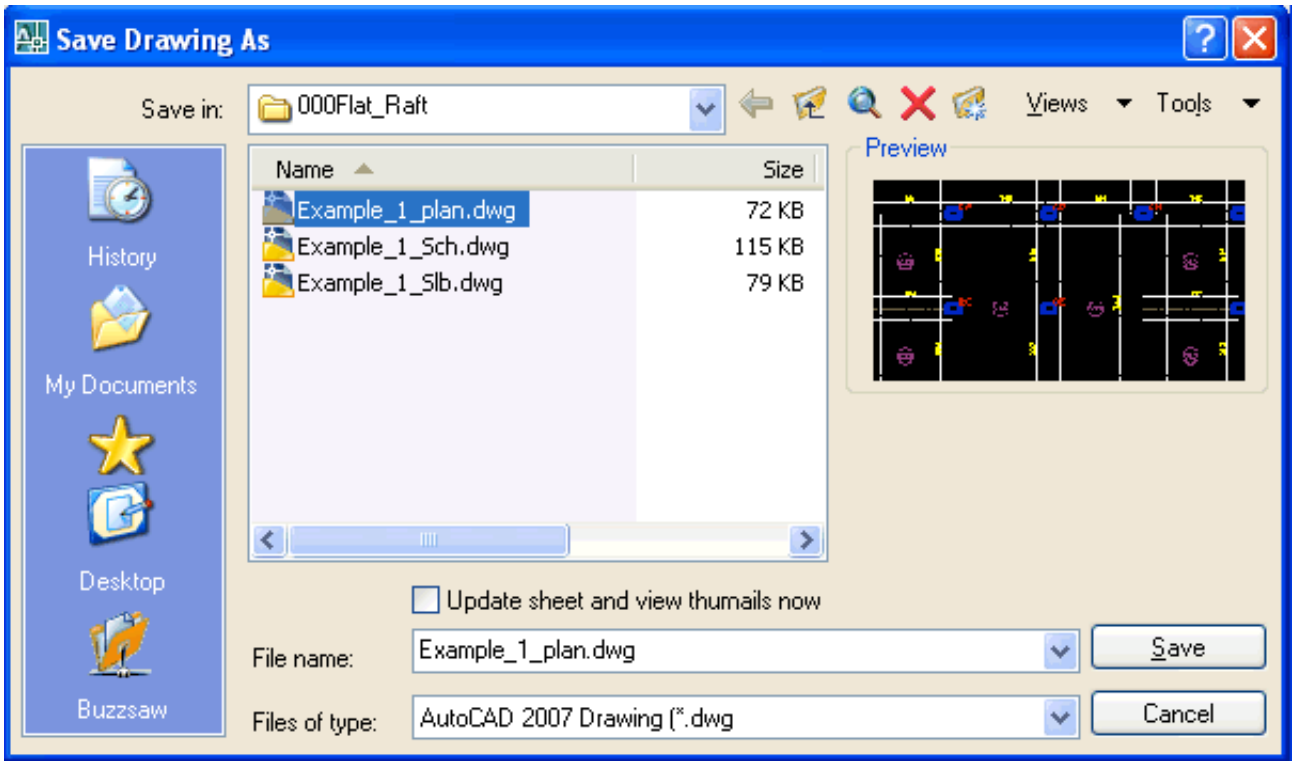


Please note that the above drawing is Editable in AutoCAD.

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.



STEP 12 IS OVER

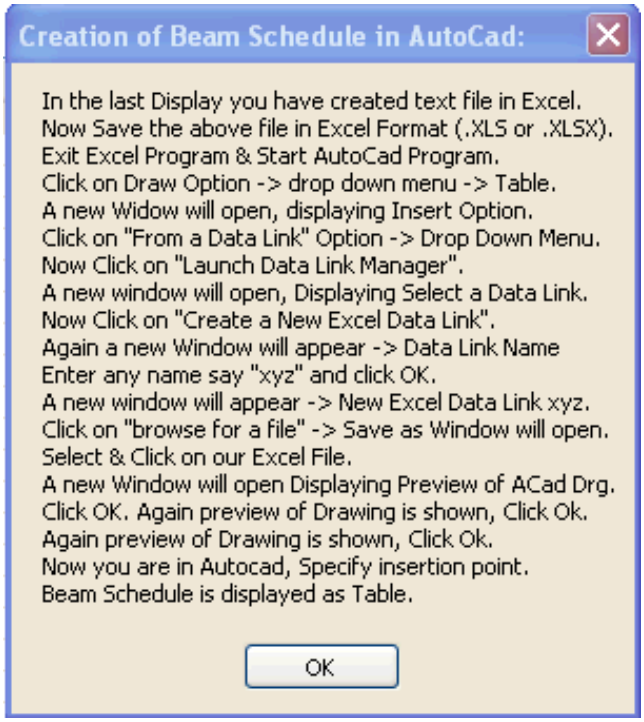
Now lets have a look on creation of Beam Schedule in the next Step....

LEARN FLAT RAFT STEP BY STEP

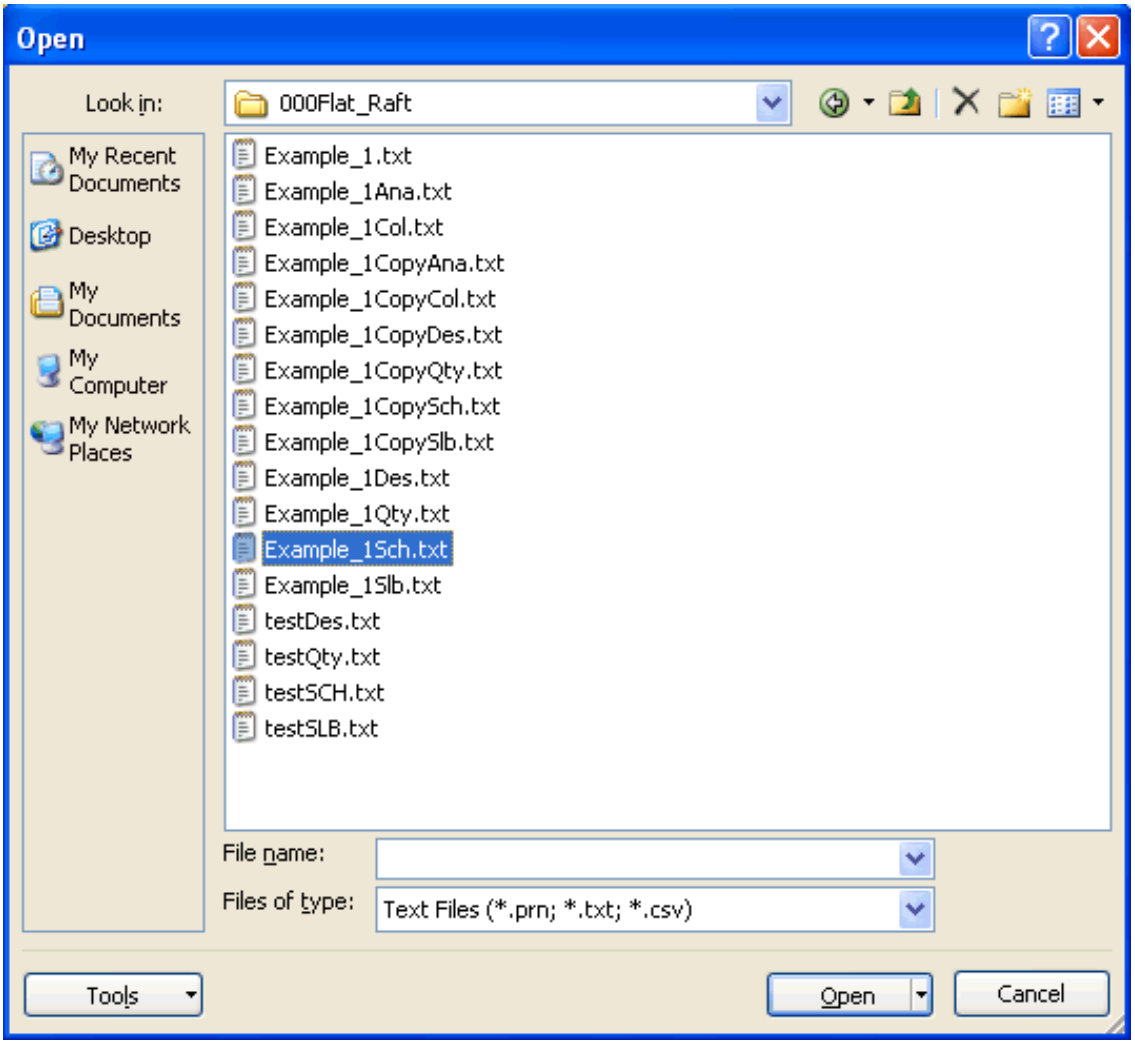
STEP 13: CREATION OF BEAM SCHEDULE IN AUTOCAD

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 10, following Graphics is displayed. We will explain this message in details.**



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

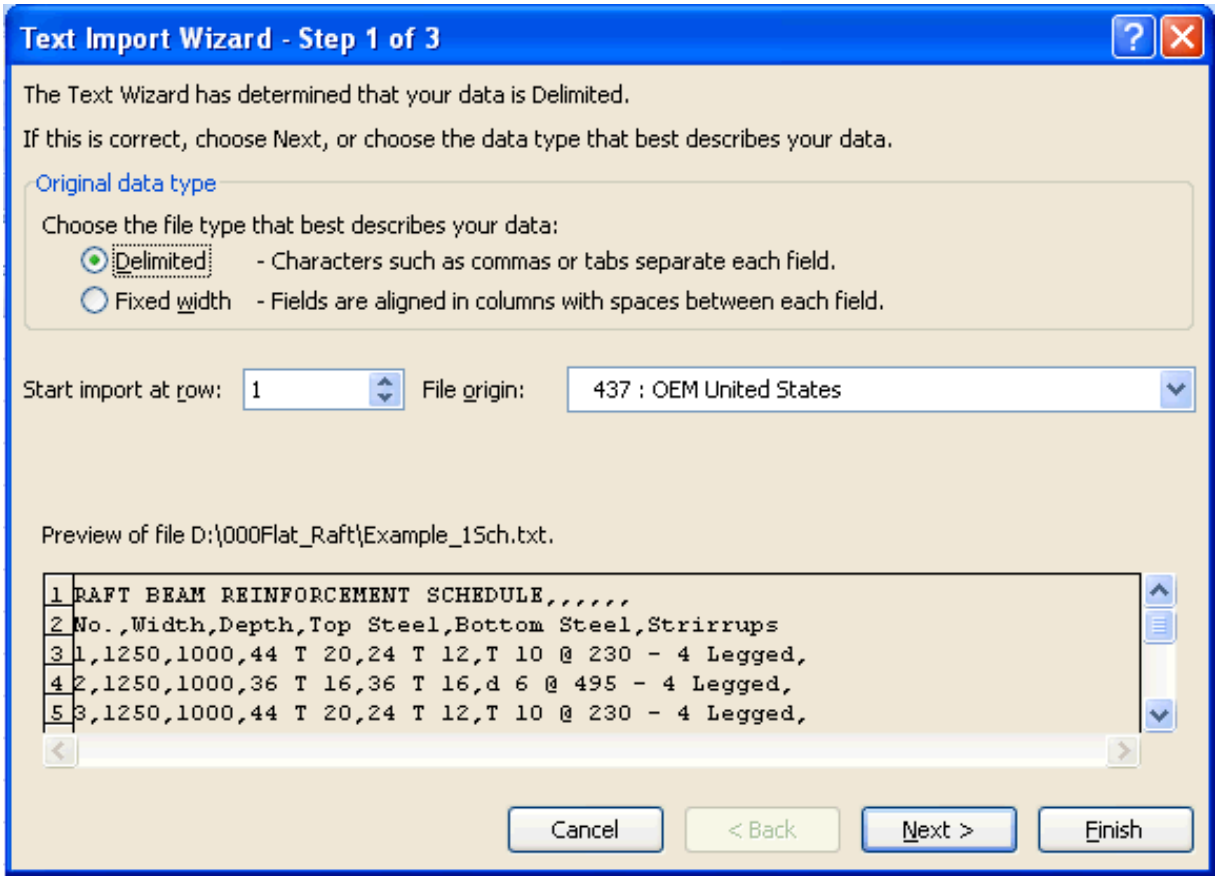


Click on Example_1Sch.txt.

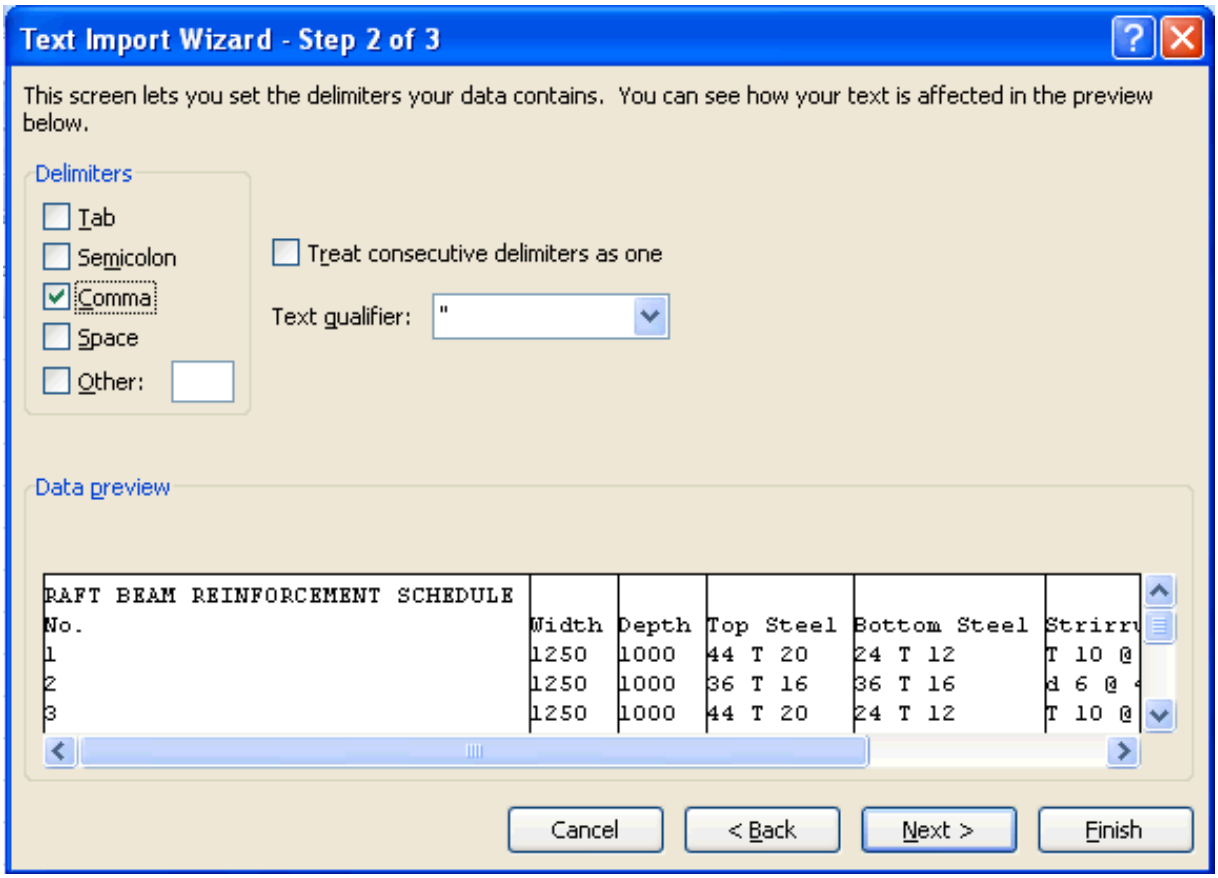
As you can see, the above file is in text format.

In the following steps we will save the file in Excel format.

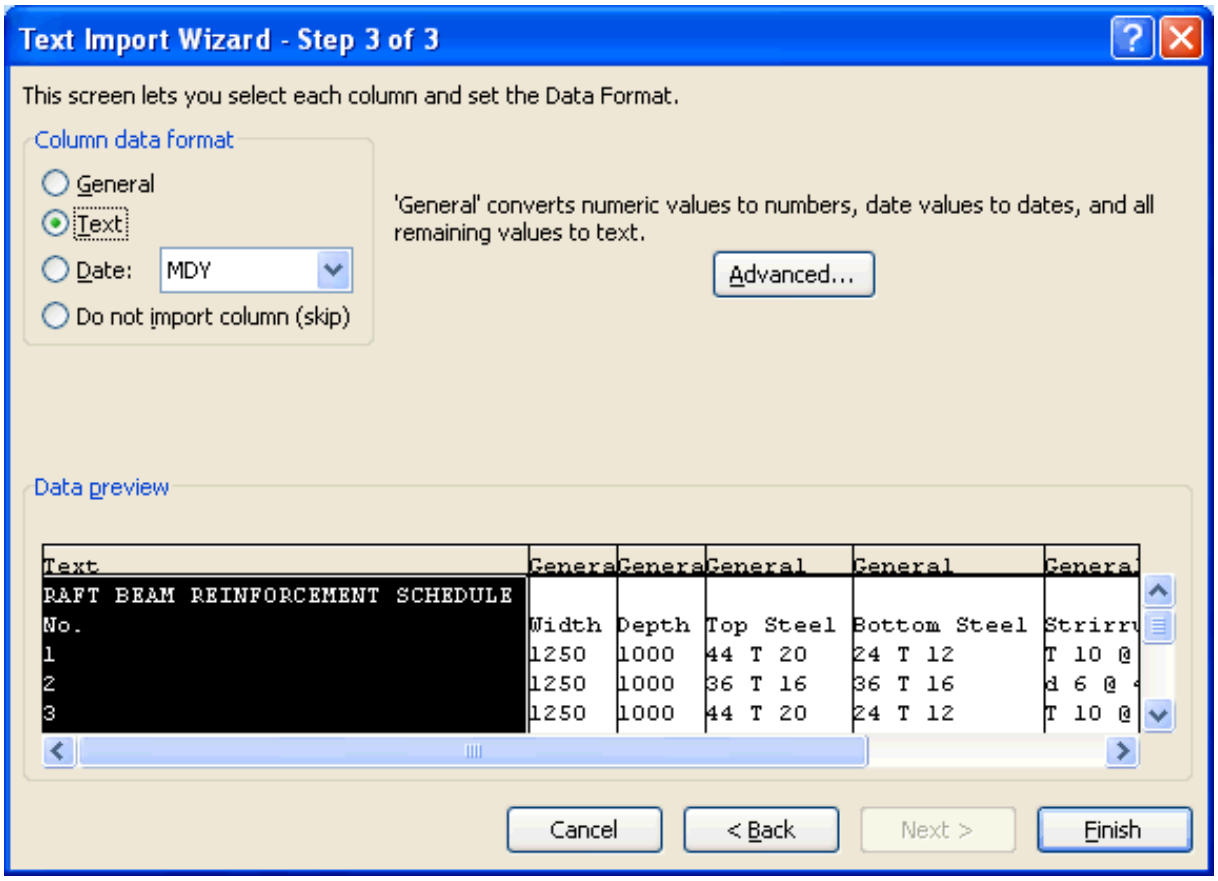
Once Example1_Sch.txt is clicked, following graphics is displayed.



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



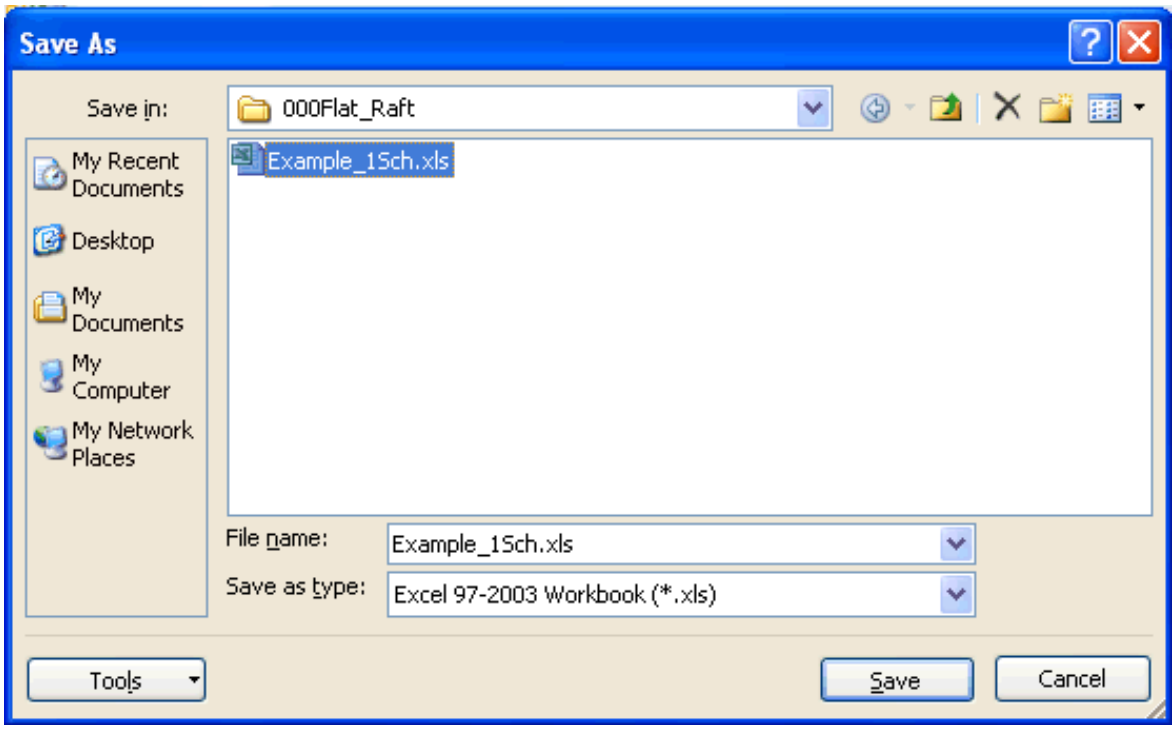
As shown Above choose Comma as Delimiter. Click On Next.
Following graphic is displayed.



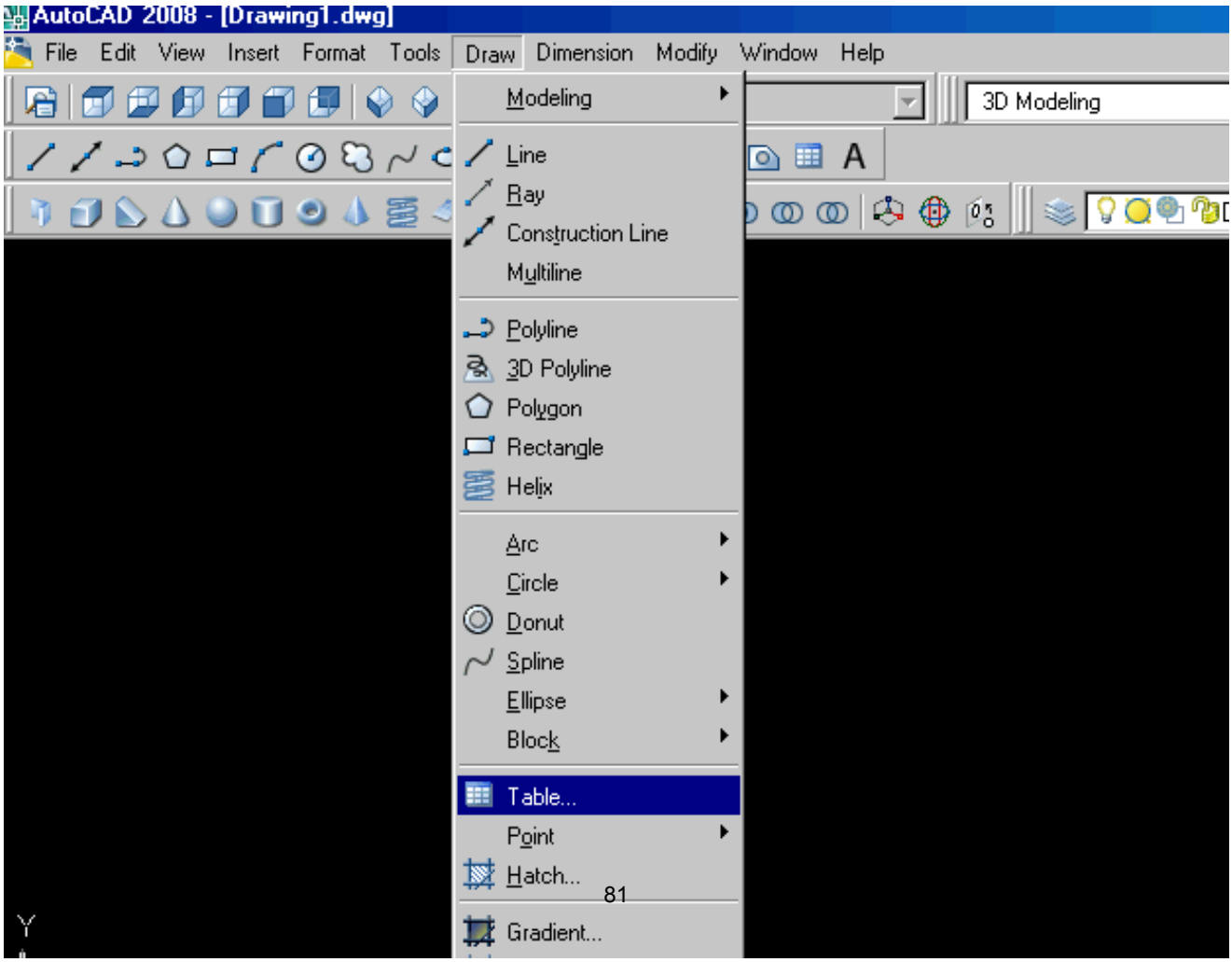
As shown above click on Text and then click on Finish.
Here you will see that Beam schedule appears in Excel . Following is a part display.
Now You can make any number of changes you want within Excel, like changing fonts, alignment of text, Column Width etc..

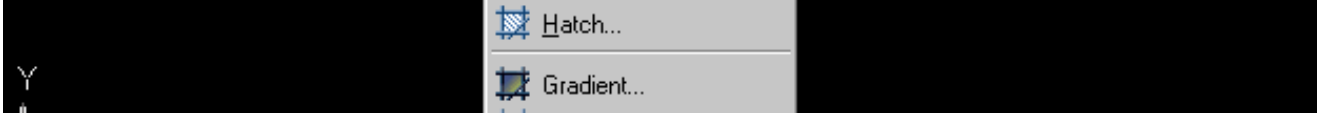
RAFT BEAM REINFORCEMENT SCHEDULE					
No.	Width	Depth	Top Steel	Bottom Steel	Strirrups
1	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
2	1250	1000	36 T 16	36 T 16	d 6 @ 495 - 4 Legged
3	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
4	2500	1000	44 T 20	26 T 16	T 8 @ 325 - 8 Legged
5	2500	1000	41 T 25	26 T 16	T 10 @ 170 - 8 Legged
6	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
7	1250	1000	39 T 12	24 T 12	d 6 @ 600 - 4 Legged
8	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
9	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
10	1250	1000	24 T 12	24 T 12	d 6 @ 600 - 4 Legged
11	1250	1000	23 T 12	24 T 12	d 6 @ 600 - 4 Legged
12	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
13	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
14	1250	1000	25 T 16	24 T 12	d 6 @ 600 - 4 Legged
15	1250	1000	25 T 16	24 T 12	d 6 @ 600 - 4 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.

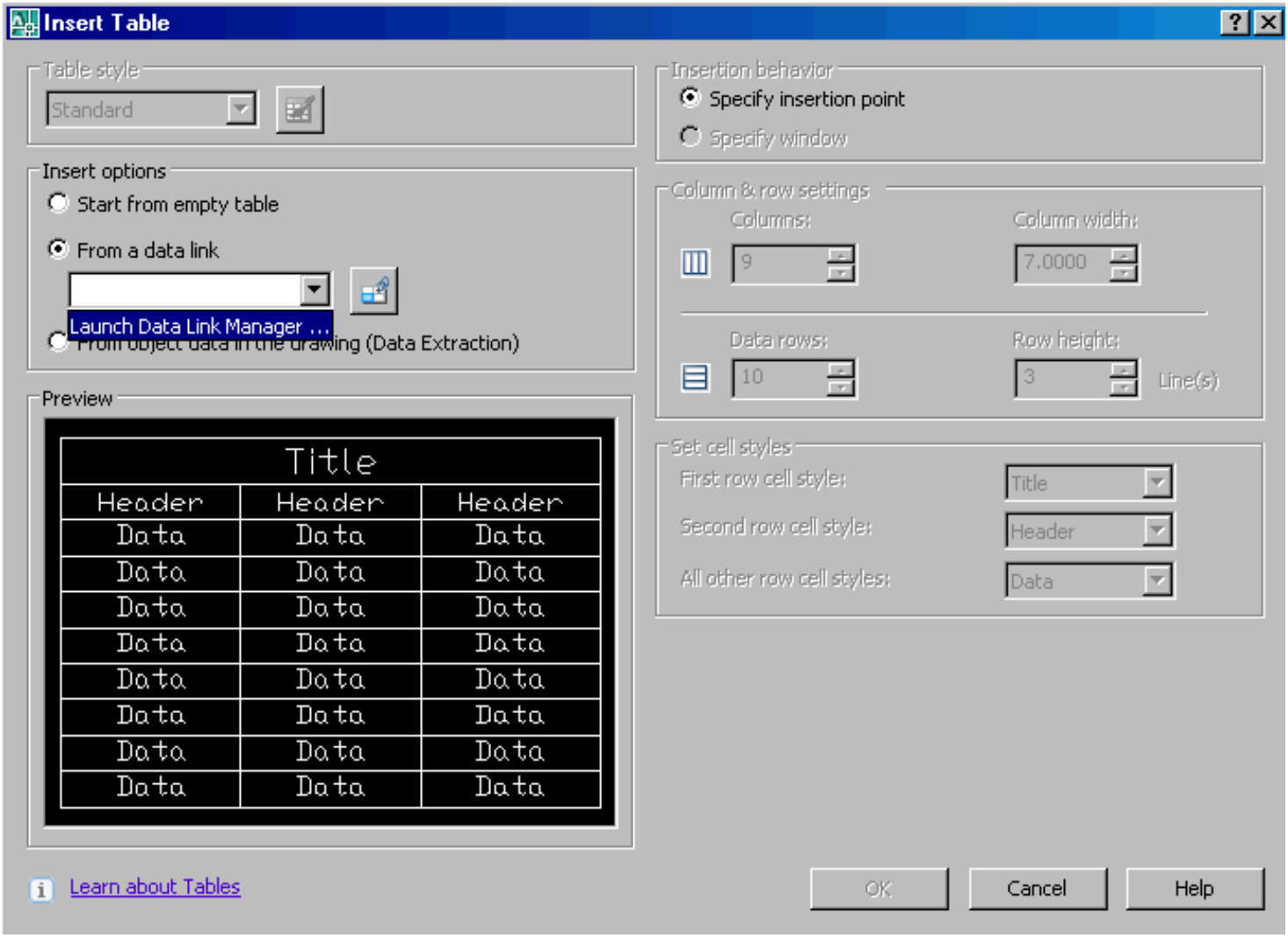




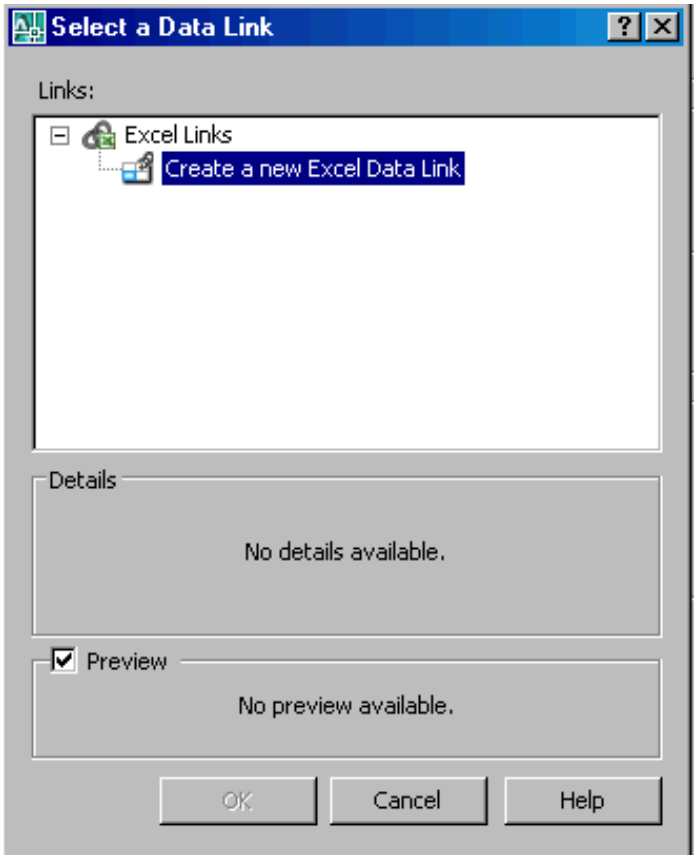
A dialogue box will appear.

As show below click on From a data link .

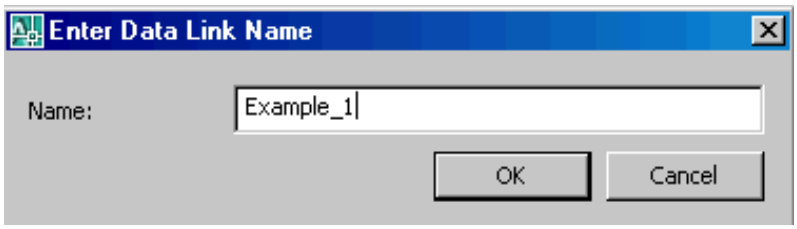
From the drop down menu click on Launch Data Link Manager.



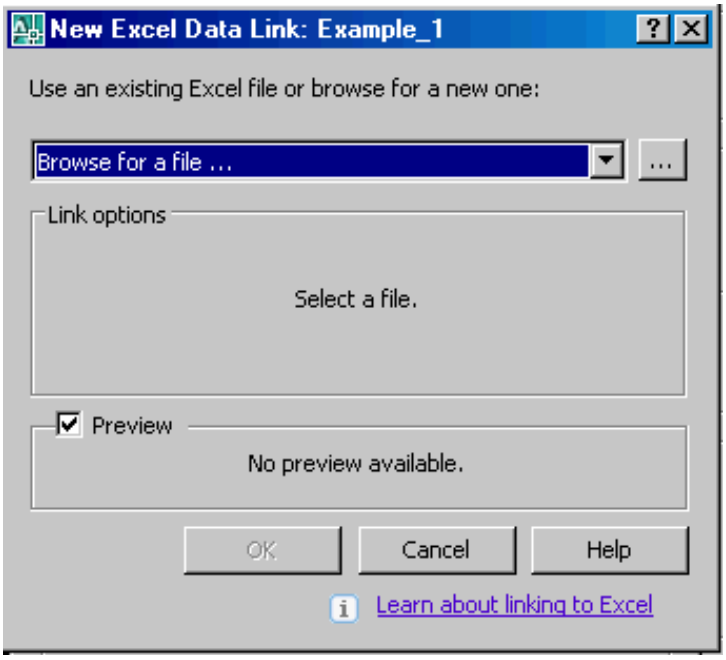
Following graphic is displayed. Click on Create a new Excel Data Link.



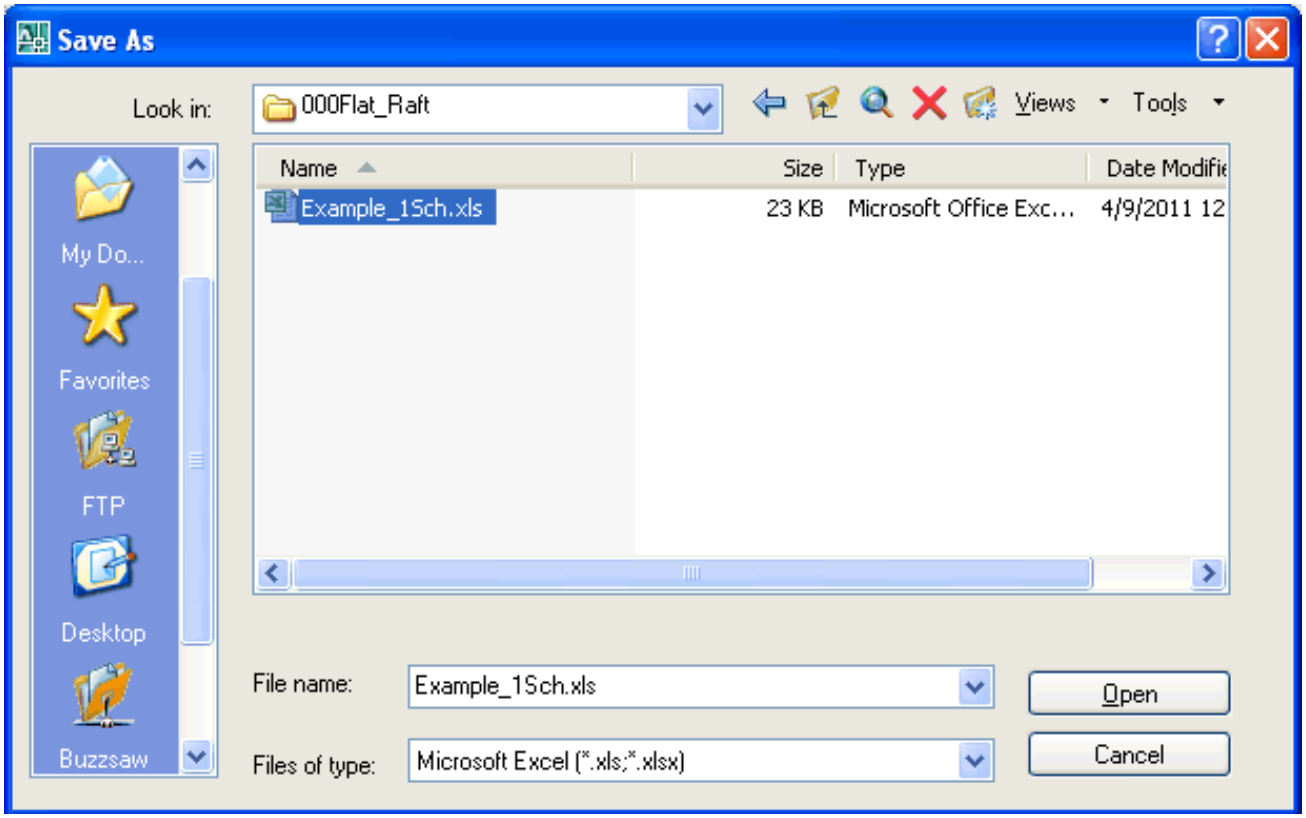
A dialogue box appears asking you to Enter a name.
You can Enter any name for e.g. Example_1.
Click on OK.



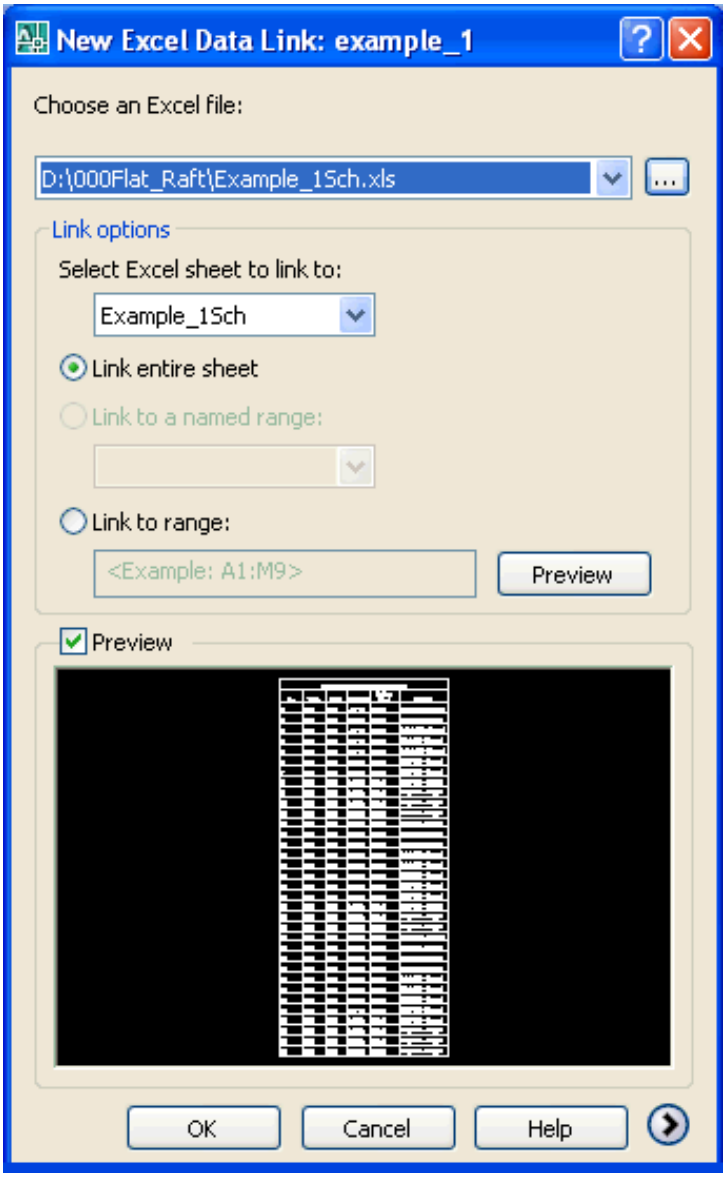
Following Graphics will appear. Click on Browse for a file.



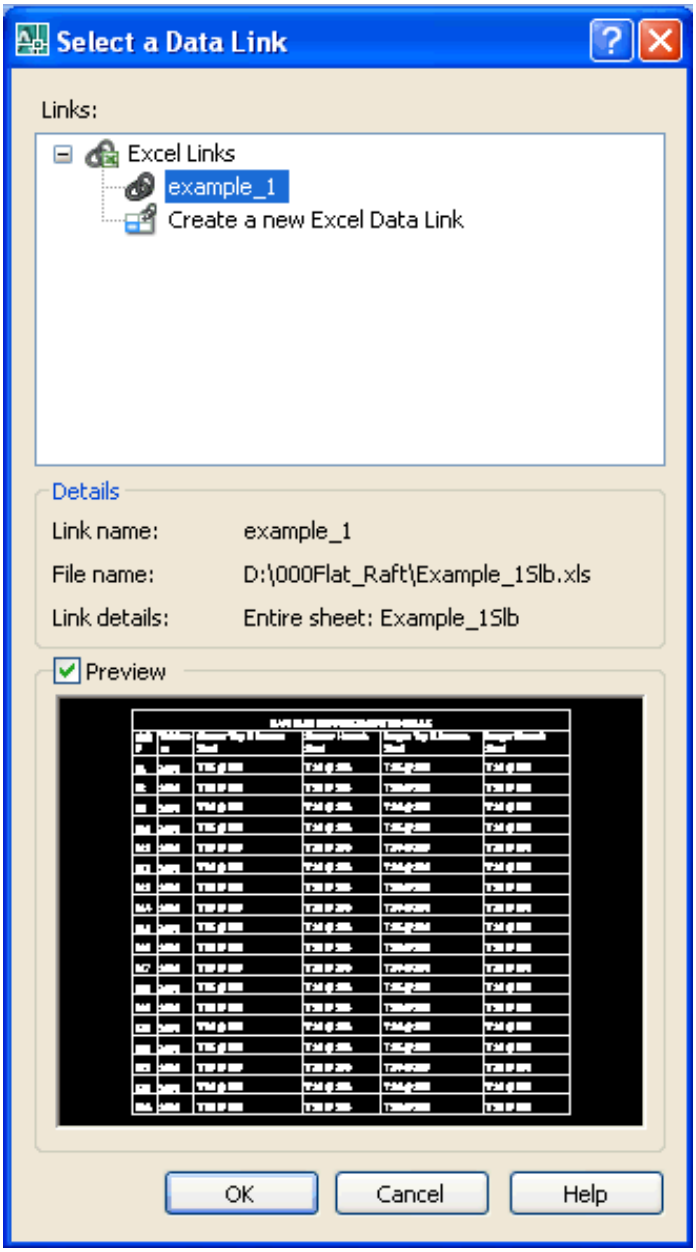
➤ **A Window dialogue box appears. Click on the required file (i.e. the file that we saved previously in Excel format) and click on Open.**



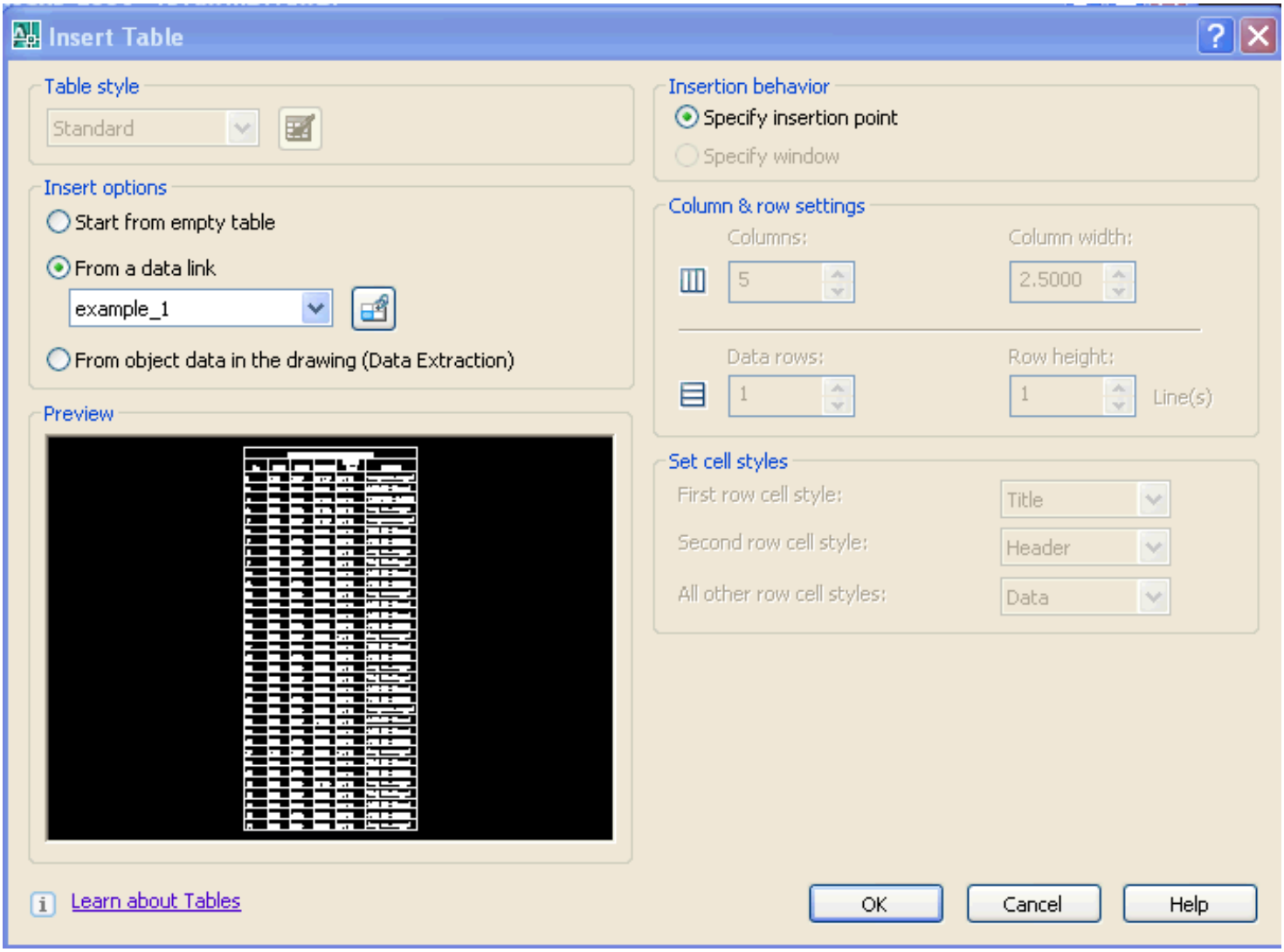
➤ **Following Graphics appears showing the preview of the table in AutoCAD. Click on OK.**



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



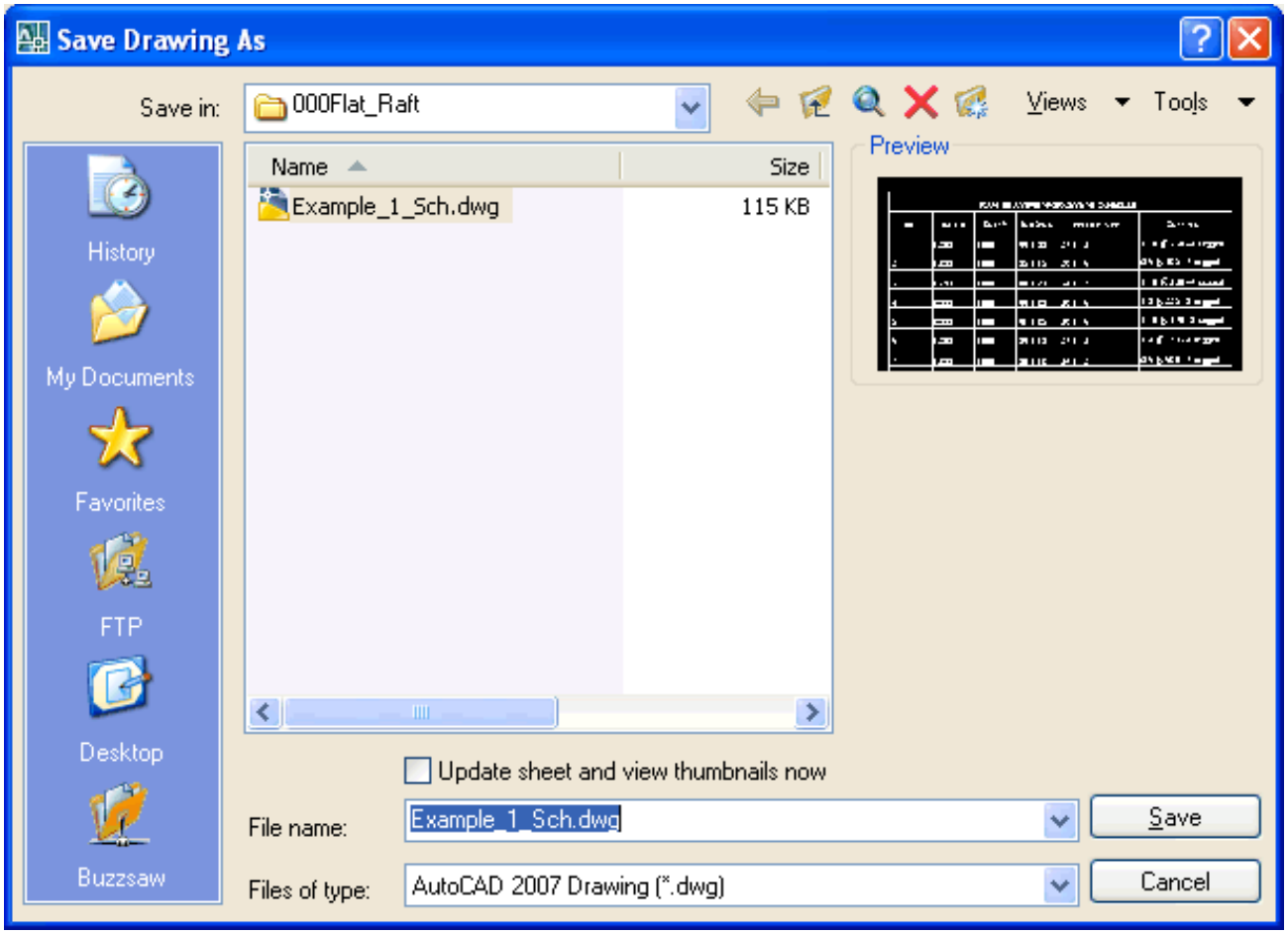
➤ **Another dialogue box appears . Click on OK.**



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

RAFT BEAM REINFORCEMENT SCHEDULE					
No.	Width	Depth	Top Steel	Bottom Steel	Strirrups
1	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
2	1250	1000	36 T 16	36 T 16	d 6 @ 495 - 4 Legged
3	1250	1000	44 T 20	24 T 12	T 10 @ 230 - 4 Legged
4	2500	1000	44 T 20	26 T 16	T 8 @ 325 - 8 Legged
5	2500	1000	41 T 25	26 T 16	T 10 @ 170 - 8 Legged
6	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
7	1250	1000	39 T 12	24 T 12	d 6 @ 600 - 4 Legged
8	1250	1000	24 T 16	24 T 12	d 6 @ 600 - 4 Legged
9	1250	1000	24 T 12	24 T 12	T 8 @ 155 - 4 Legged
10	1250	1000	24 T 12	24 T 12	d 6 @ 600 - 4 Legged
11	1250	1000	23 T 12	24 T 12	d 6 @ 600 - 4 Legged

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



STEP 13 IS OVER

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

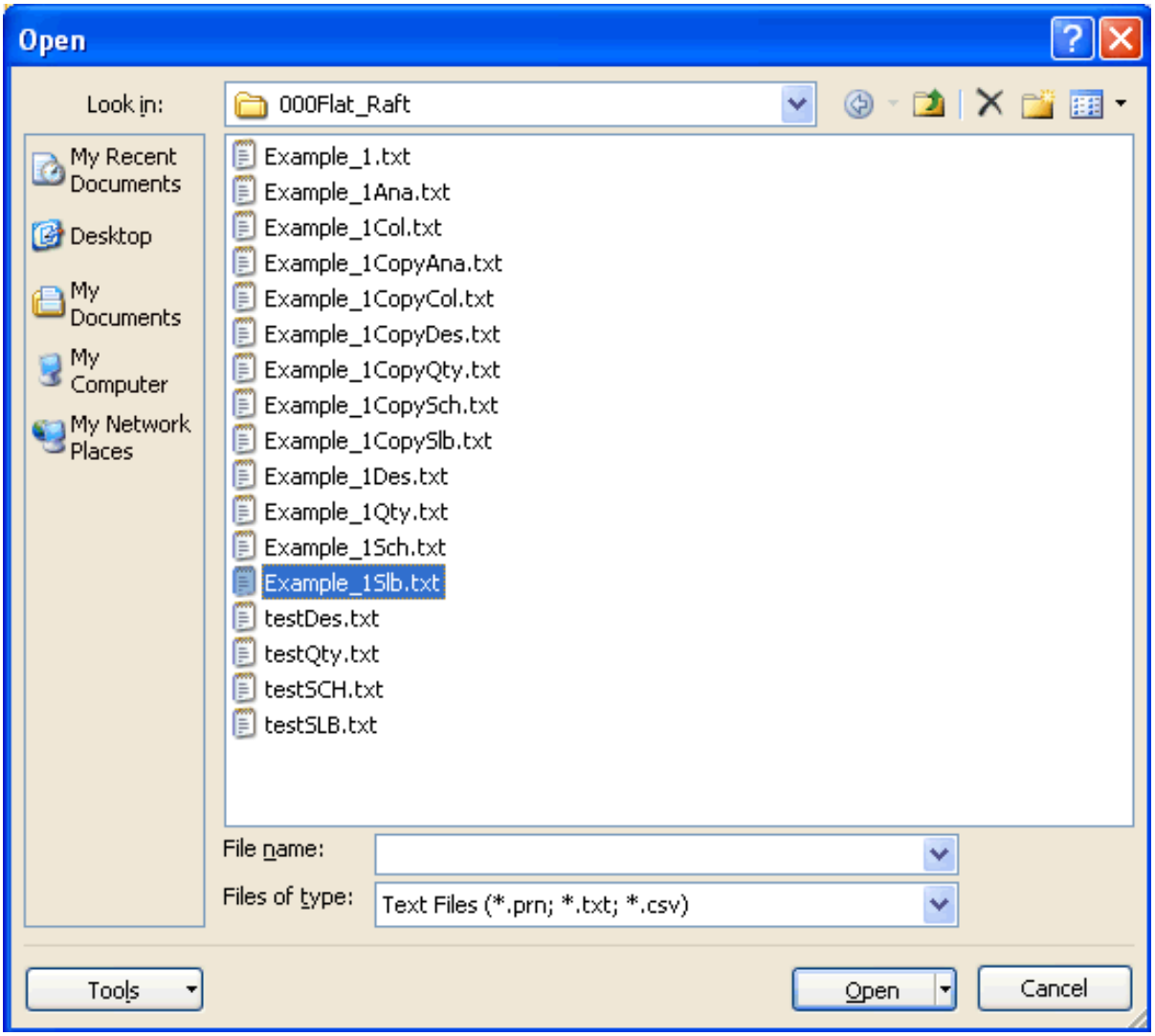
LEARN FLAT RAFT STEP BY STEP

STEP 14: CREATION OF SLAB SCHEDULE IN AUTOCAD

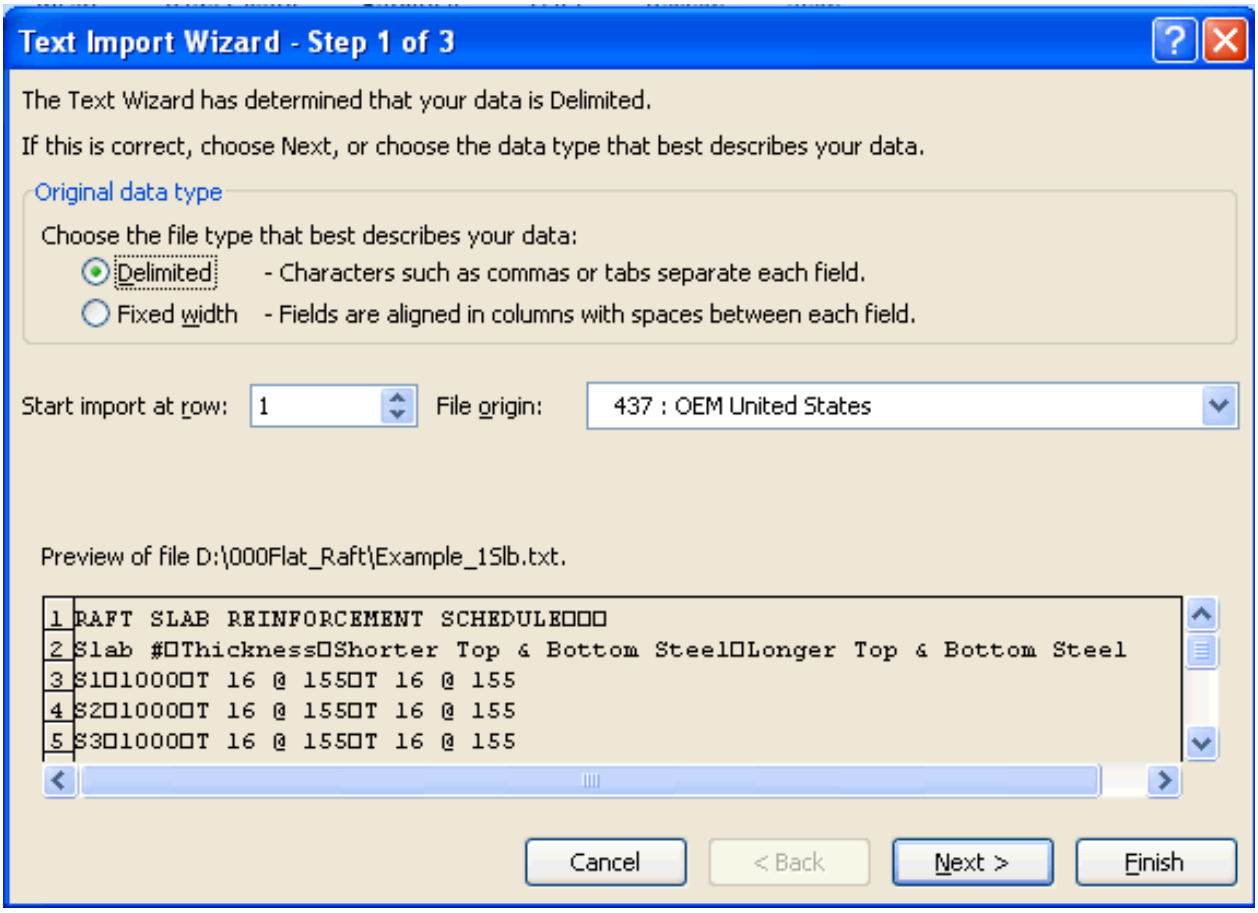
Creation of Slab Schedule in AutoCAD is almost same as that of beam schedule with just a few changes here and there ....

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

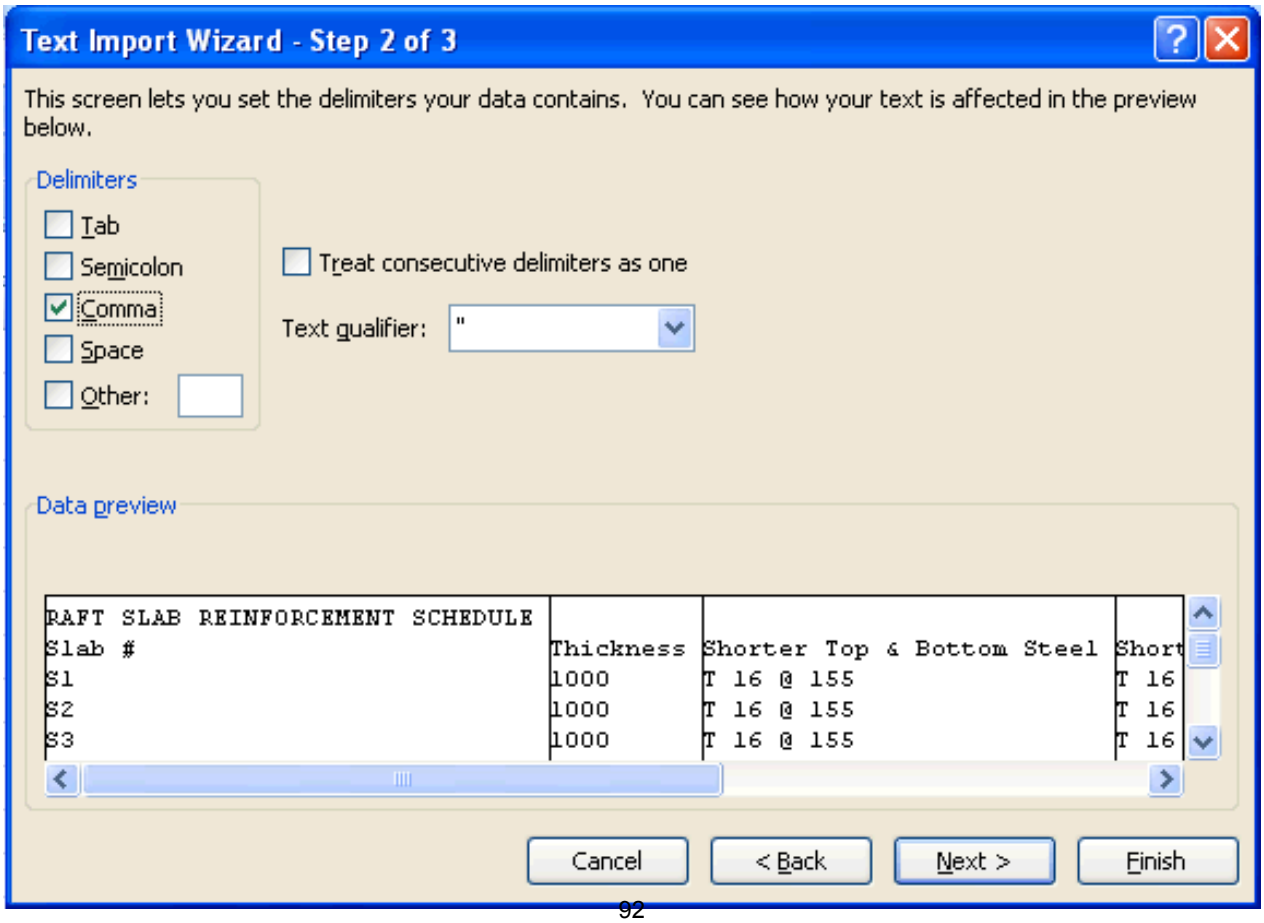
- **Start Microsoft Excel . Click On Open. Following Graphics is Displayed.**



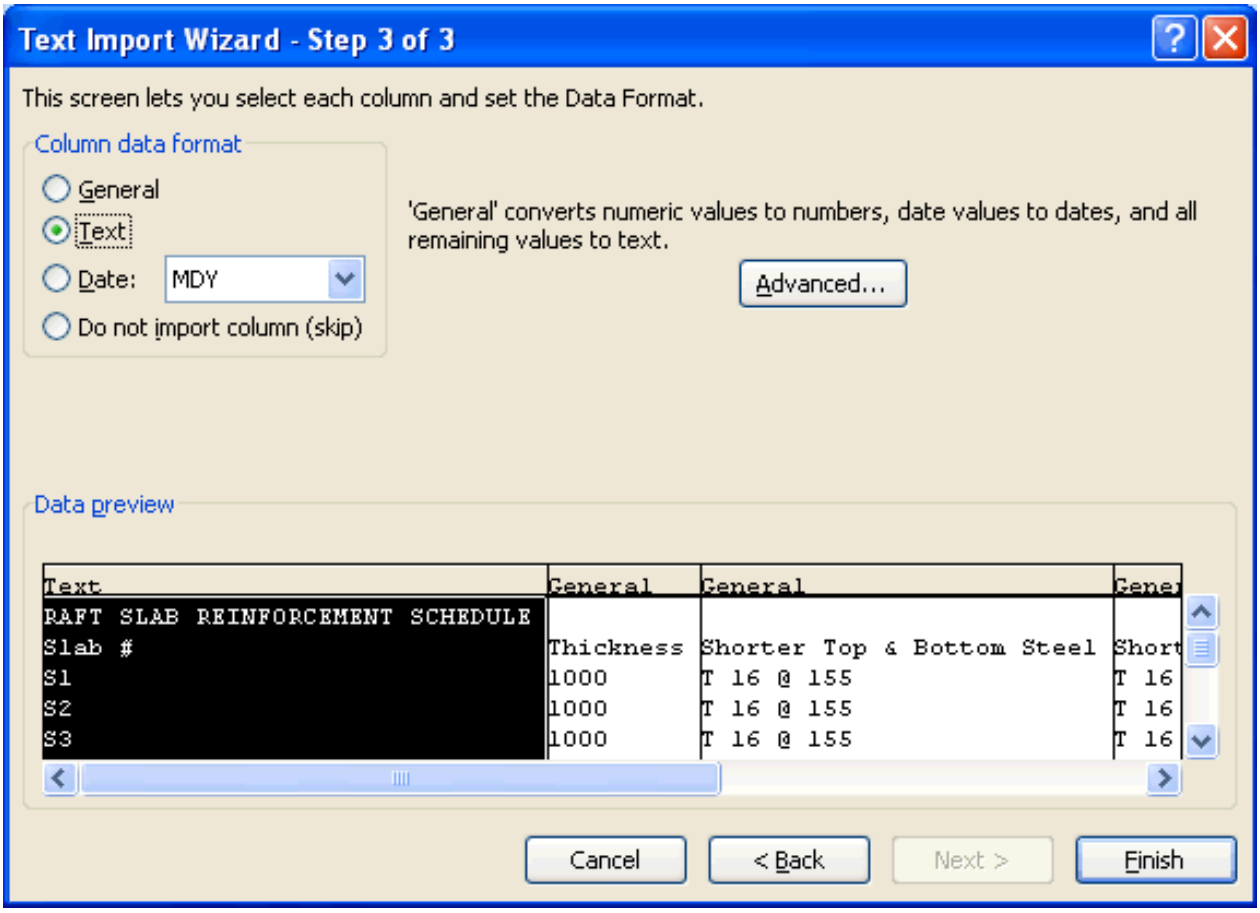
Click on Example_1Slb.txt.
As you can see, the above file is in text format.
In the following steps we will save the file in Excel format.
Once Example1_Slb.txt is clicked, following graphics is displayed.



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



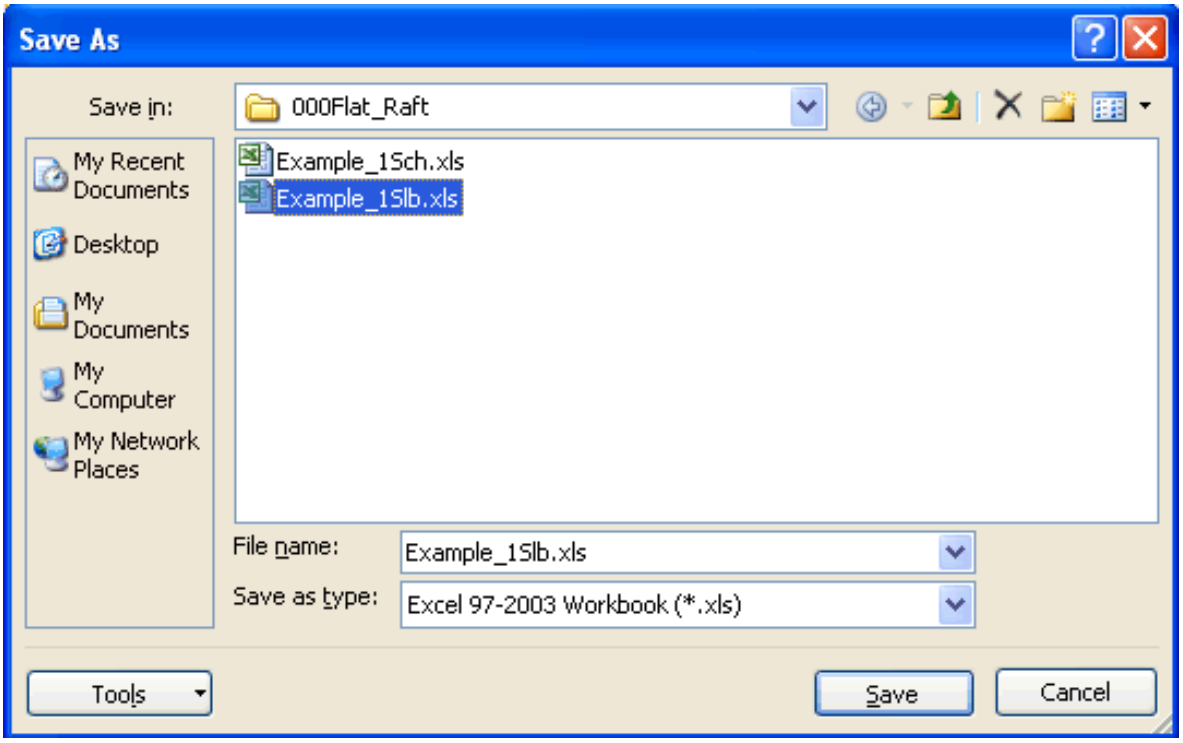
As shown Above choose Comma as Delimiter. Click On Next.
Following graphics are displayed.



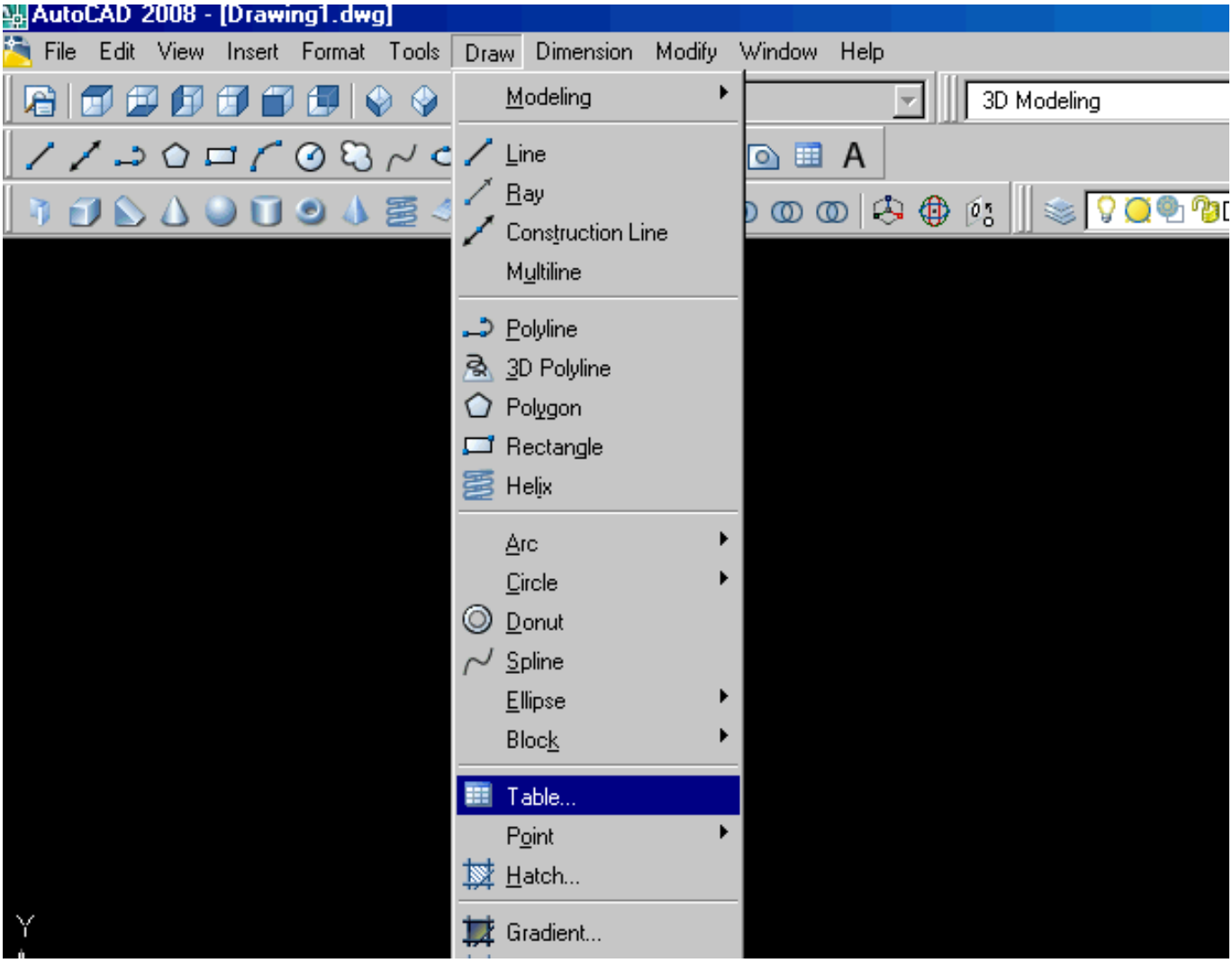
As shown above click on Text and then click on Finish.
Here you will see that Slab schedule appears in Excel . Following is a part display.
Now You can make any no of changes you want within Excel, like changing fonts, alignment of text, Column Width etc..

RAFT SLAB REINFORCEMENT SCHEDULE			
Slab #	Thickness	Shorter Top & Bottom Steel	Longer Top & Bottom Steel
S1	1000	T 16 @ 155	T 16 @ 155
S2	1000	T 16 @ 155	T 16 @ 155
S3	1000	T 16 @ 155	T 16 @ 155
S4	1000	T 16 @ 155	T 16 @ 155
S5	1000	T 16 @ 155	T 16 @ 155
S6	1000	T 16 @ 155	T 16 @ 155
S7	1000	T 16 @ 155	T 16 @ 155
S8	1000	T 16 @ 155	T 16 @ 155
S9	1000	T 16 @ 155	T 16 @ 155
S10	1000	T 16 @ 155	T 16 @ 155
S11	1000	T 16 @ 155	T 16 @ 155
S12	1000	T 16 @ 155	T 16 @ 150
S13	1000	T 16 @ 155	T 16 @ 155
S14	1000	T 16 @ 155	T 16 @ 150
S15	1000	T 16 @ 155	T 16 @ 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.**



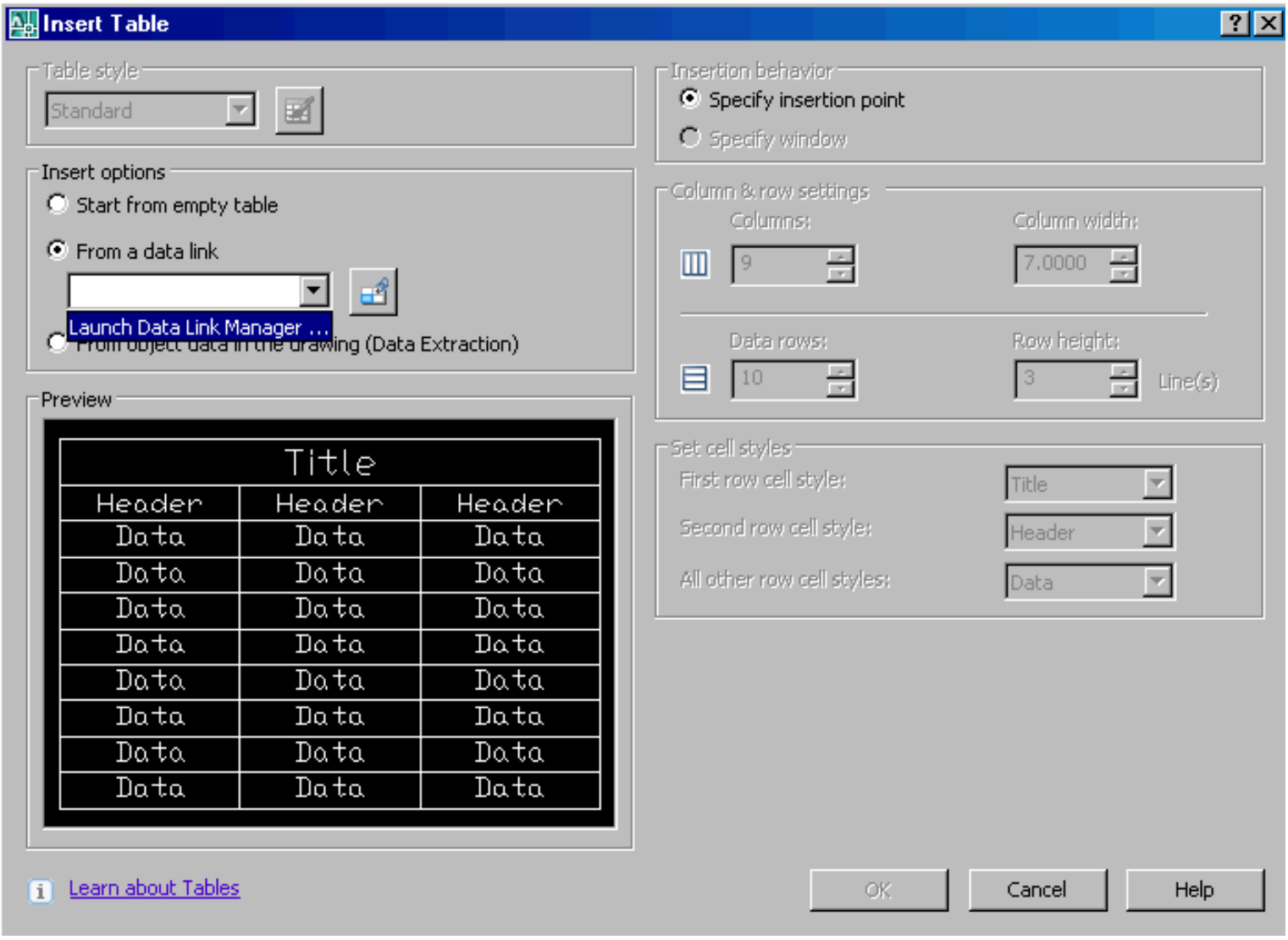
➤ **Start AutoCAD. Click on DRAW . From the drop down menu click on Table a shown below.**



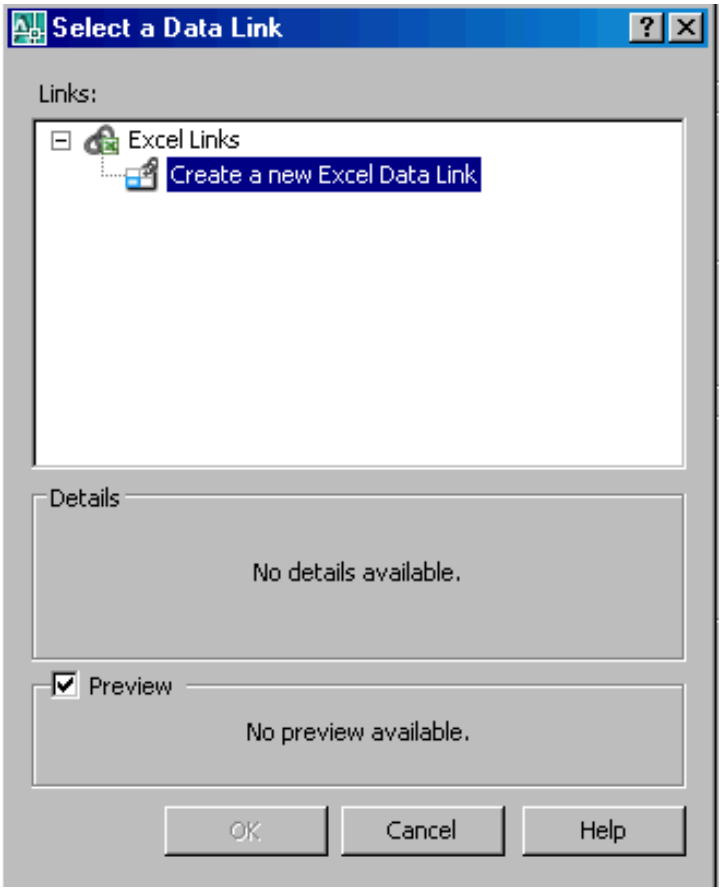
A dialogue box will appear.

As show below click on From a data link .

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

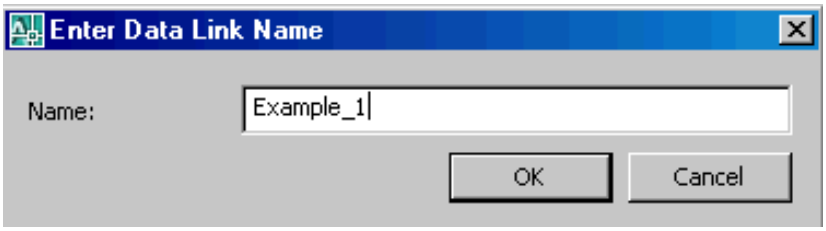


Following graphics are displayed. Click on Create a new Excel Data Link.

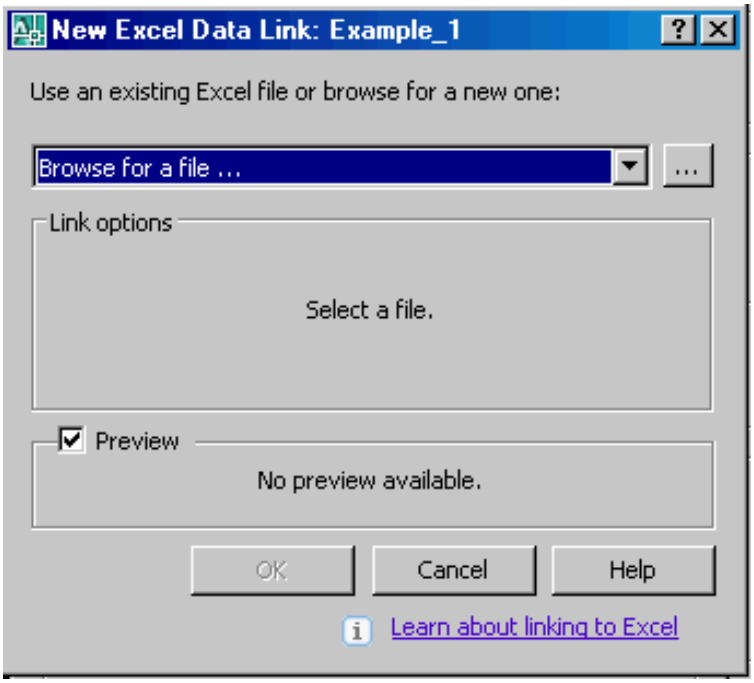


A dialogue box appears asking you to Enter a name.

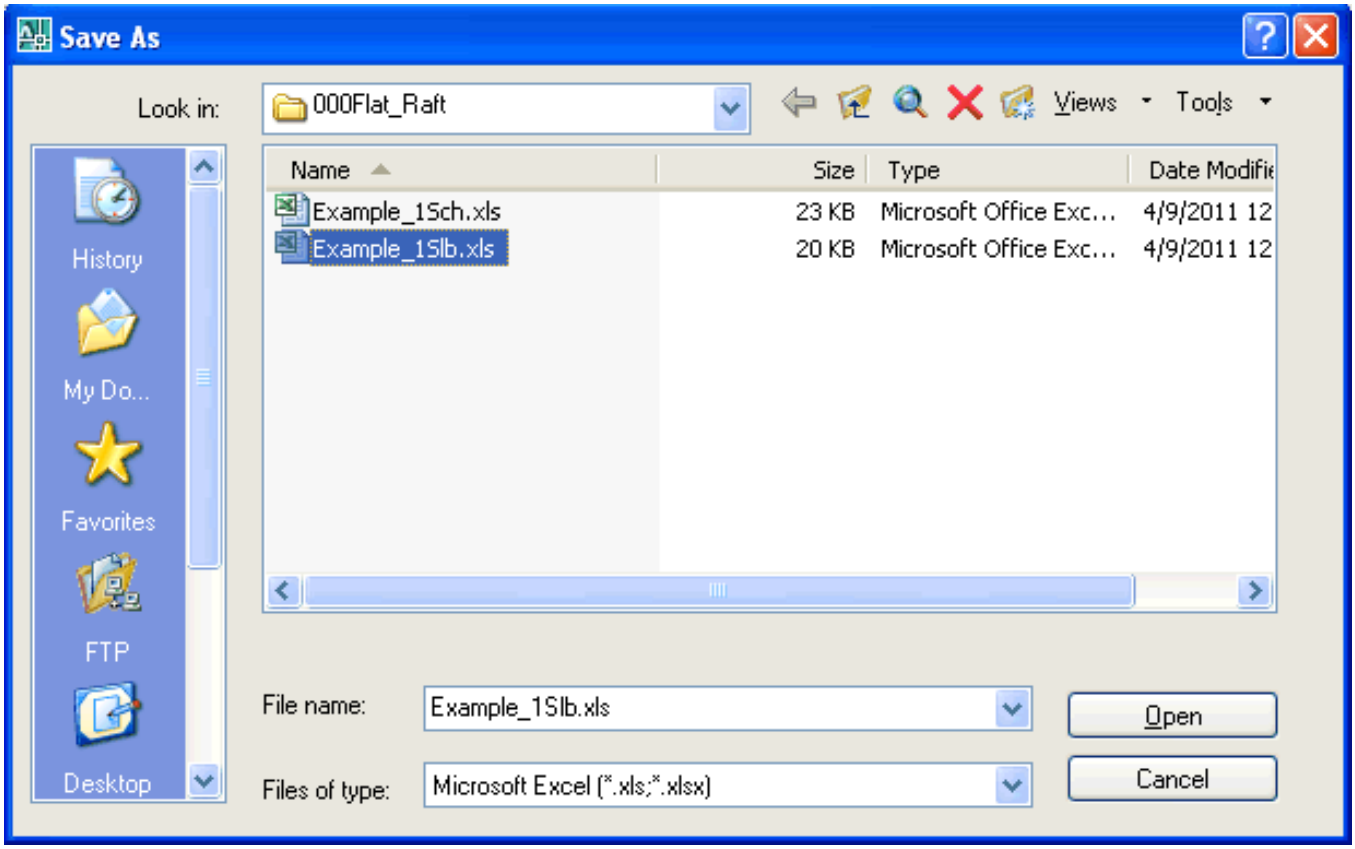
- **You can Enter any name for e.g. Example_1.**
  Click on OK.



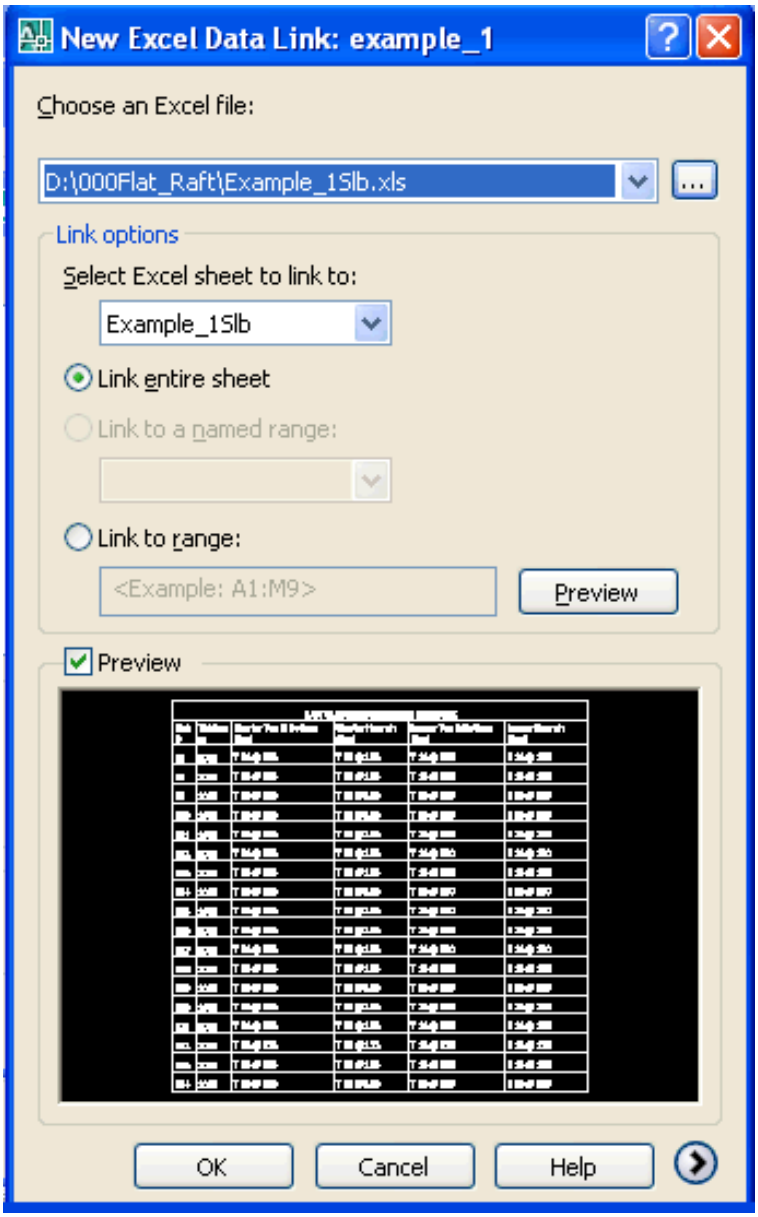
- **Following Graphics will appear. Click on Browse for a file.**



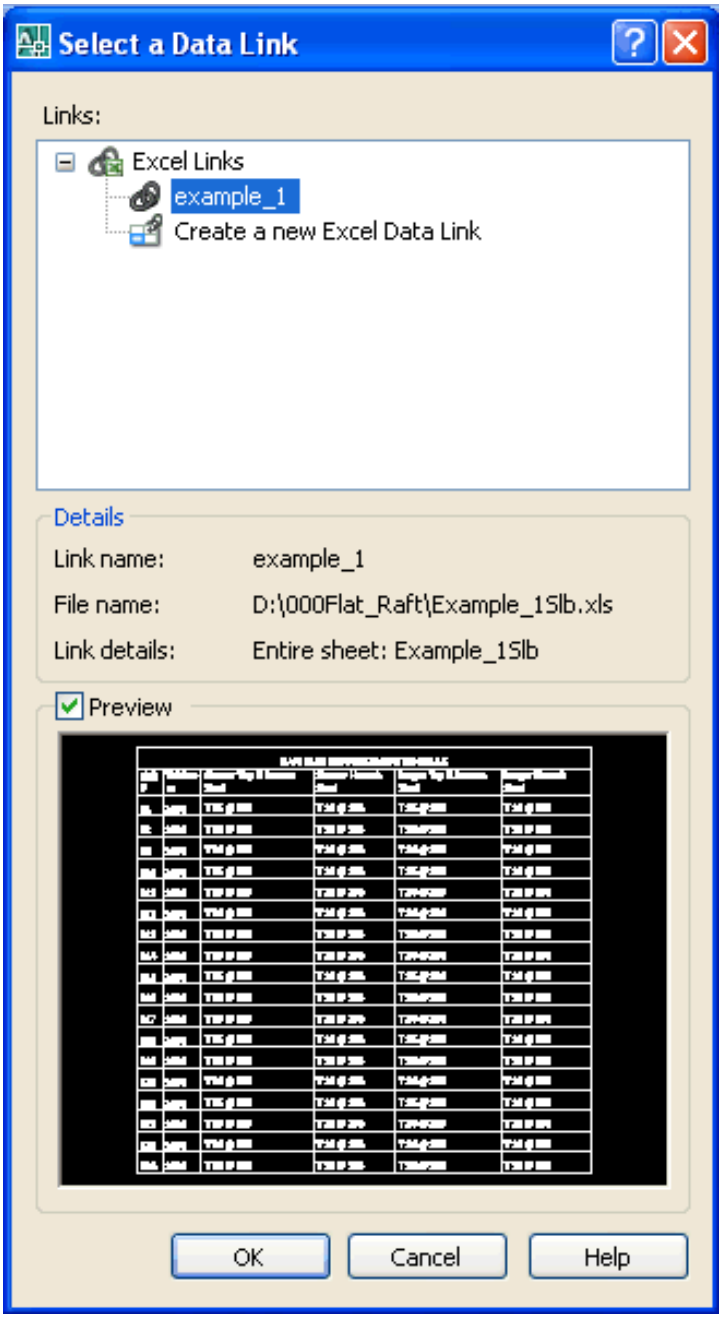
➤ **A Window dialogue box appears. Click on the required file (i.e. the file that we saved previously in Excel format) and click on Open.**



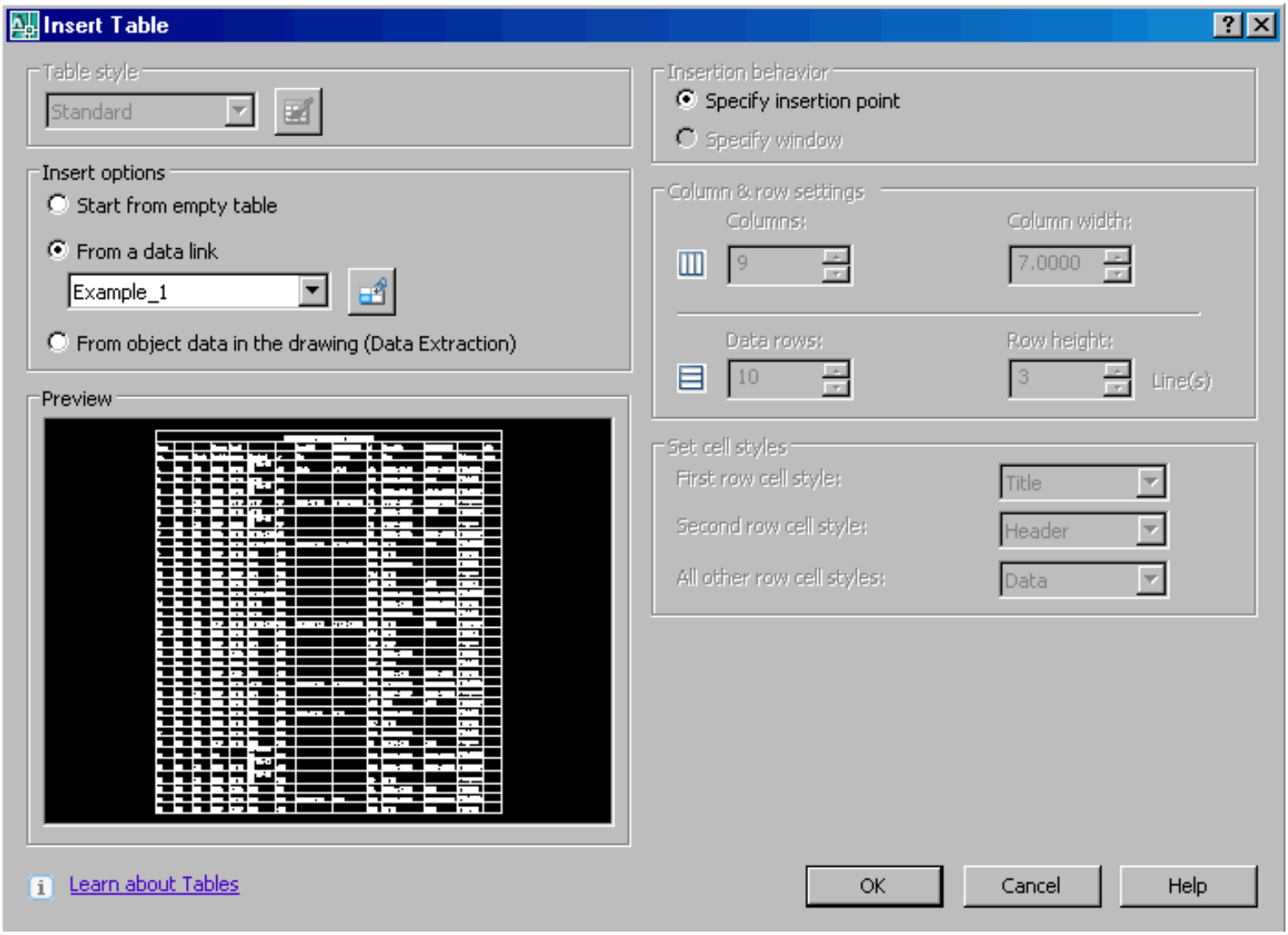
➤ **Following Graphics appears showing the preview of the table in AutoCAD. Click on OK.**



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



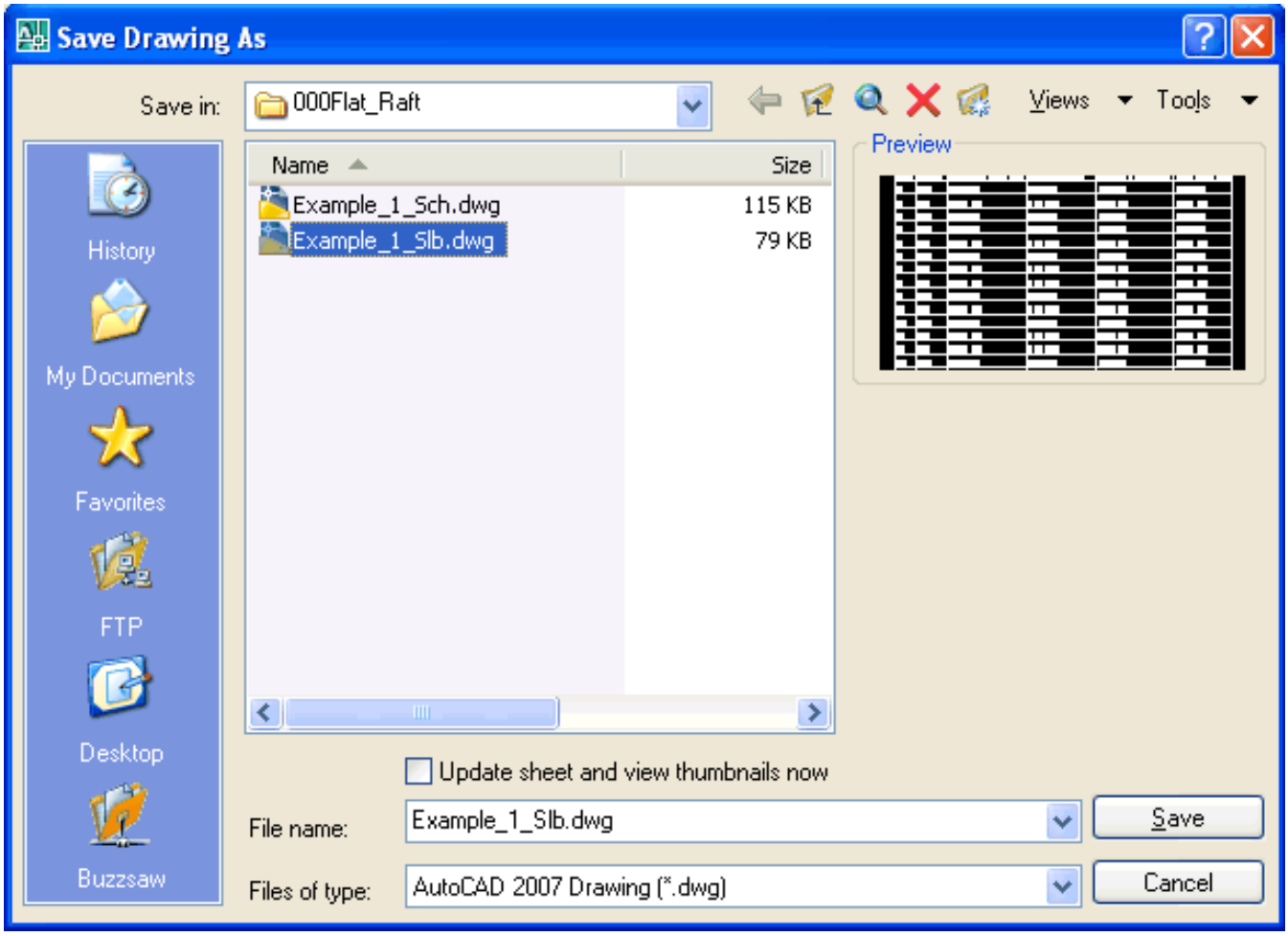
➤ **Another dialogue box appears . Click on OK.**



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

RAFT SLAB REINFORCEMENT SCHEDULE			
Slab #	Thickness	Shorter Top & Bottom Steel	Longer Top & Bottom Steel
S1	1000	T 16 @ 155	T 16 @ 155
S2	1000	T 16 @ 155	T 16 @ 155
S3	1000	T 16 @ 155	T 16 @ 155
S4	1000	T 16 @ 155	T 16 @ 155
S5	1000	T 16 @ 155	T 16 @ 155
S6	1000	T 16 @ 155	T 16 @ 155
S7	1000	T 16 @ 155	T 16 @ 155
S8	1000	T 16 @ 155	T 16 @ 155
S9	1000	T 16 @ 155	T 16 @ 155
S10	1000	T 16 @ 155	T 16 @ 155

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



Learn FLAT RAFT is over.

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

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