



# **S A D S**

**Version 20.0**

**Gold Sun**

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# 1 Overview

## 1.1 Introduction

**SADS**, the Structural Analysis and Design System, is a knowledge-based expert system which performs the calculations of reinforced concrete buildings in Hong Kong, Singapore and Malaysia environment and has been used in Hong Kong for more than 20 years.

Since **SADS** came out, it has been constantly improved and upgraded, according to the actual encountered problems we met and the comments of structural and computer professional experts. Therefore, it is no doubt that **SADS** is a proven professional software package in Hong Kong.

**SADS** calculates the reinforced concrete by matching information the user provided with information contained in **SADS** databases. The user provides the value of structural requirement about the building and **SADS** provides the optimization calculation technique, then **SADS** combines these two sources of information to calculate the reinforced concrete in the buildings.

**SADS** adopts a database system to integrate all the data which are supplied by the user and the intermediate results which are obtained from **SADS** as a whole database. This database can be used in any module inside **SADS** whenever they need and can be retrieved automatically by each module wherever required. The user does not need to repeat the executions of inputting data in each module of **SADS**, hence the preparation time is shortened and the risk of making mistakes in the repetitions of inputting data is eliminated.

**SADS** provides the "validate" function in the corresponding module, to assist the user easily find out the inputting data is correct or not.

**SADS** enables the user to view graphically about the beam sketch, column section, wall section, frame sketch, etc., to show whether the results of the data provided by the user is accurate and allows the user to edit the reinforced bar for some requirements.

**SADS** provides the whole solution of the calculation of reinforced concrete inside the building, all computer output like reports, calculation results and graphical presentations are designed to fit Hong Kong and Singapore practical environment.

**SADS** allows the user to modify all the existing data. If the architectural plan and loading of the building are changed for some requirement, the user simply makes the corresponding changes, **SADS** can retrieve all the new amended data combines with the old input data accurately to calculate the new reinforced concrete of the building.

**SADS** includes data generator for saving data input time. If users have valid and complete output file (MDB) of ETABS, users may use this data generator to generate floor data, batch data, slab data, beam data, column data, wall data and lintel data.

**SADS** provides the ETABS interface program to link between the output file of ETABS to **SADS** database. The users may use the output file of ETABS to import the force data to **SADS** database. Also, after running pre-design of beams, columns, walls and lintels in **SADS**, the users may use the updated sections of beams, columns, walls and lintels to amend the input file of ETABS (e2k) for further analyze in ETABS.

**SADS** provides the online linking with ETABS using OAPI. This is a two ways linking. **SADS** can create ETABS models using its database. **SADS** can run ETABS analysis, import material properties and section properties, export the member forces to **SADS** for designing member sections.

**SADS** had a series of drawing interface programs -- **BDIP**, **CDIP** and **SDIP**, they are tailor-made for **SADS**, to assist the **SADS** user accomplish the beam drawing, column drawing and slab drawing, that turns your **SADS** into a powerful tool for your business.

## 1.2 What's new in version 20.0

1. Redesign the Collect Joint Data Sub-command. It becomes more simple and more stable.
2. The BC joint design program got BD prior acceptance..
3. The Gravity loading collection of column and wall got BD prior acceptance.

## 1.3 System requirement

**SADS** is designed to operate on a stand-alone personal computer. The minimum system requirement is listed as below.

- IBM or compatible personal computer.
- Pentium 4, 2 GHz or higher.
- 2 GB RAM or higher.
- Super VGA 800 x 600 graphic adapter or higher.
- 100 MB of free hard disk space for program and data file.
- Laser Printer with 600x600dpi or higher;
- Windows XP, Windows 7, Windows 8 and Windows 10.

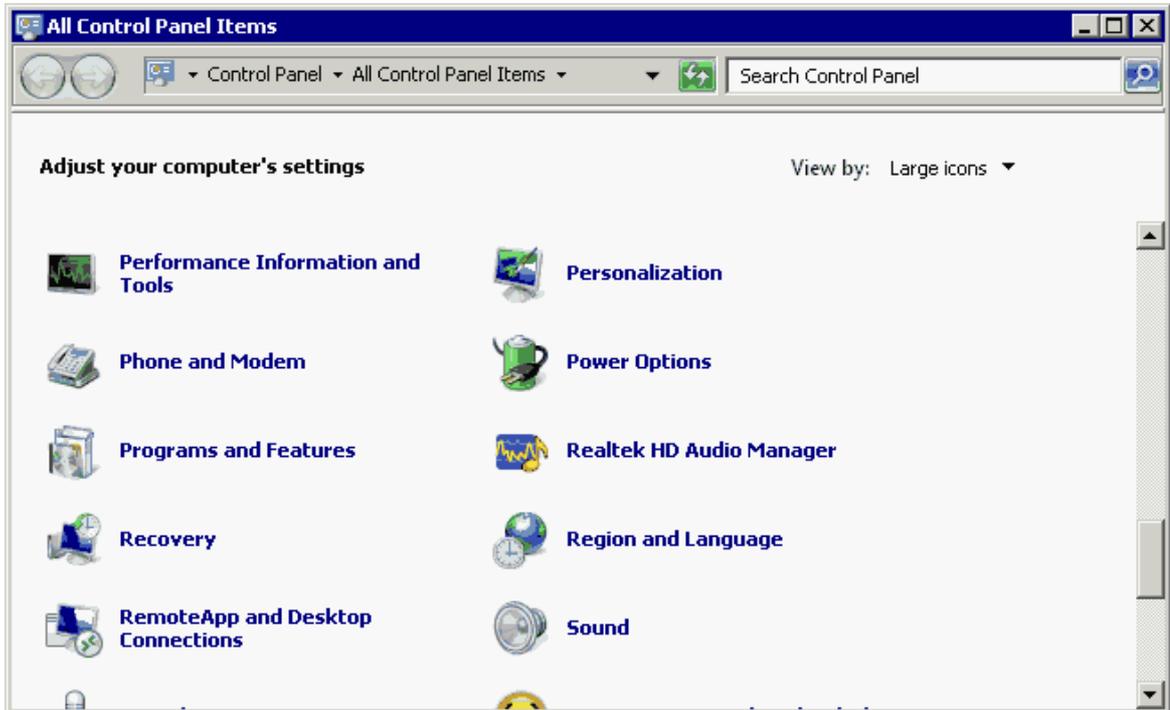
## 1.4 Installation

**SADS** is distributed on CD-ROM. The procedures of installation are described as below.

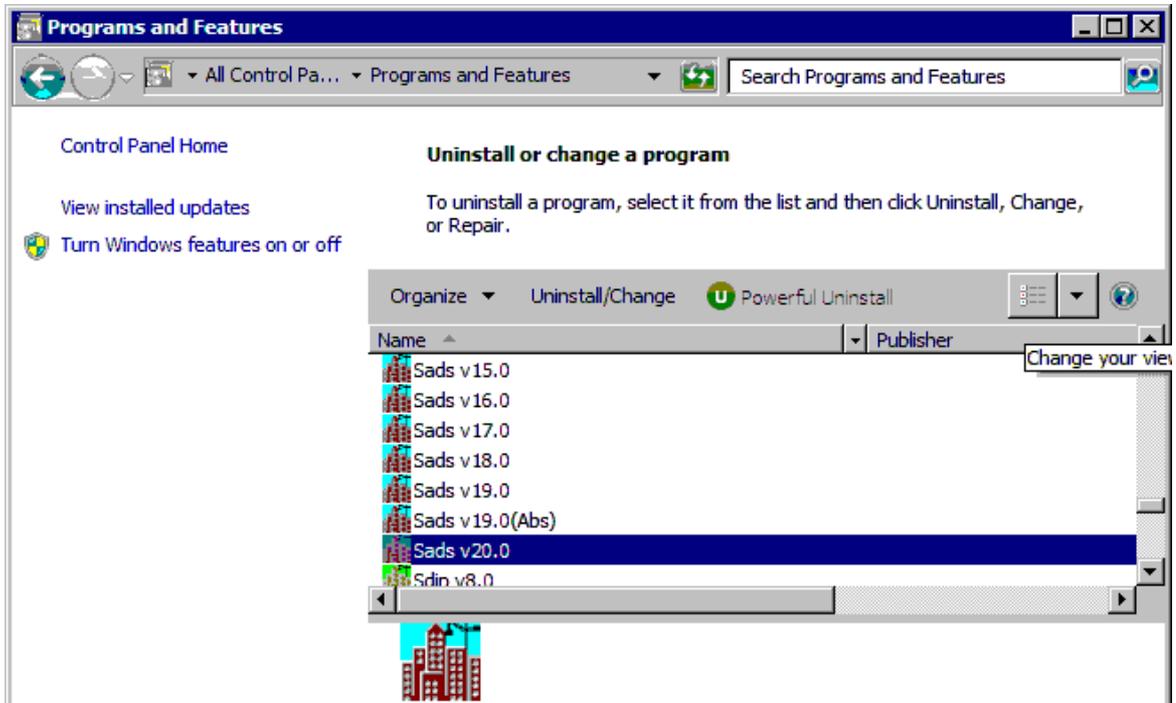
1. Install Borland Database Engine (BDE): If your computer has no BDE installed, you need to double click the BdeSetup.exe in root folder in the setup CD-ROM. You may follow the instructions shown on the screen to install.
2. Install **SADS** application: You can double click the SadsSetup.exe in <CD-Drive>:\**SADS** 20 folder and follow the instructions shown on the screens to install **SADS**.
3. Install Data Examples: If this data examples has not been install before, you can double click the DataSetup.exe in <CD-Drive>:\**SADS** 20folder and follow the instructions shown on the screens to install Data Examples.

## 1.5 Uninstallation

To uninstall **SADS**, you need to choose **Start | Control Panel** to display the **Control Panel** window.



Click on the **Programs and Features** icon, The **Program and Features** dialog box is displayed as below.

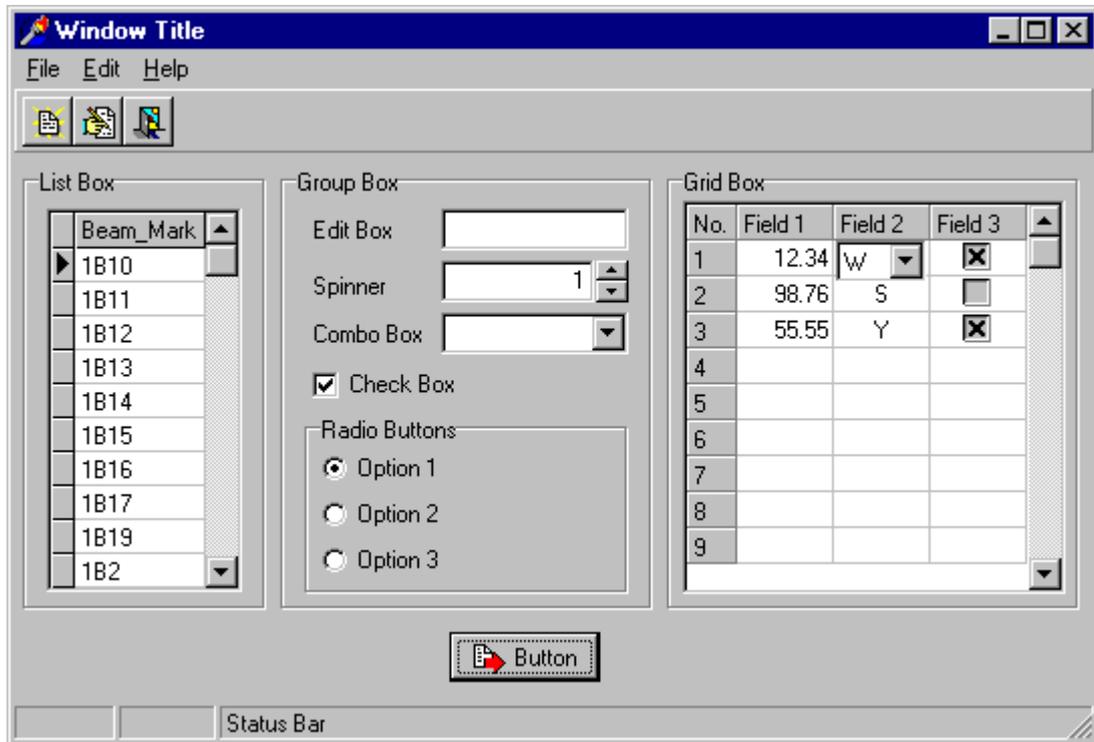


You may follow the instructions shown in the screens to uninstall **SADS** application.

## 2 How to use SADS

### 2.1 Window Components

The window components are used to perform certain task. The components shown in following window are used widely in **SADS**.



**Menu Bar** - It is located at the top of window. It displays the menu name, when you click on it, a drop down menu that contains several menu items is displayed. If you choose one of the menu item, **SADS** will perform a certain command or display drop down sub-menu that contains sub-menu items. If you select one of sub-menu item, **SADS** will perform a certain sub-command.

**Button Bar** - It is located under Menu Bar. It is a graphic representation. There are many buttons on it. The functions of these buttons are the same as menu items or sub-menu items, they provide one of the easiest ways to start or open the task.

**List Box** - It is use to display the mark and/or other field of existing data. You may click a line to retrieve the data record and display the data to another window components. The list box is not

editable, except there is  button below the list box. If so, you may click this button to display a resizable window that contain all marks in the list box. You may drag any mark in the window and drop to any new position in the window to rearrange the order of marks.

**Group Box** - The component is use to group the related components in a window. It has a caption on top left border.

**Edit Box** - The component is use to display or edit data. There are 3 types of edit box:

1. String edit box that can display or edit alpha numerical characters.
2. Float edit box that can display or edit floating point number.
3. Integer edit box that can display or edit integer number only.

**Spinner** - You may use it to enter and control certain range of integer number.

**Combo Box** - When you click the arrow button at the right of the box, the component will display a drop down list box, You may select an item from the list to provide data to **SADS**.

**Check Box** - The component is use to select a binary decision like yes/no, true/false. Click the component to change it's status: check and uncheck.

**Radio Buttons** - The component can perform multiple choice selections. Click on one of radio button to select the option.

**Grid Box** - The component consists a set of rows and columns that define cells at each intersection of those rows and columns. A row contains a data record and a column is a field record. The column (field) can be edit box, combo box or check box. You may edit the data in each cell to maintain database of **SADS**. The first column and first row have gray surface and are not editable. It is named as fixed column and fixed row. if you click the fixed column of a grid box and see the arrow cursor is changed to arrow with a bar, you may use drag and drop to move the row. The procedures are:

1. Move the cursor to the row that you want to move.
2. Hold down the mouse left button.
3. Drag to a new position in the grid box.
4. Release the mouse button.

The row you drag will be moved just before the new row.

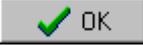
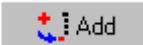
**Button** - At lower part of **SADS** window, there are several buttons with graphical image and caption. You may click on these buttons to perform certain operation.

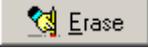
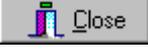
**Status Bar** - The component is located at the bottom of windows. There are 3 panel on the bar. The left panel is use to display the project code, the middle panel is use to display the design method and the right panel is use to display other information.

You may use mouse to operate all component inside the window. Or you may use the "Tab" key to move from one component to other component, use "Enter" key or "Arrow" key to move from cell to cell inside the Grid.

## 2.2 Common Buttons

The following common buttons are commonly used in **SADS** windows and perform similar operations.

-  - Click it to start the operation and close the active window.
-  - Click it to cancel or ignore the operation and close the active window.
-  - Click it to prepare a new record at sorted position.
-  - Click it to append a new record at the end of table.
-  - Click it to insert a new record at the current record position, i.e. at highlighted row of Mark at the list box.
-  - Click it to delete the current data record. **SADS** will prompt you with a dialog box to confirm that you are sure to delete the data record.
-  - Click it to copy the current data record. **SADS** will prompt you with dialog box to ask you where the data to be copied to.
-  - Click it to save the data record that you have changed.
-  - Click it to ignore the changes you have made and restore the original data record from database. **SADS** is always save data when you move to another data record or close the active window automatically. So, if you want to ignore the changes you made, you must click this button before doing the other operations.
-  - Click it to perform calculation and display or print calculation sheets for your reference or submission to B.D.

-  - Click it to print or plot selected print jobs to printer or file.
-  - Click it to fill all available print jobs to print jobs grid box.
-  - Click it to delete a highlighted print job for print jobs grid box.
-  - Click it to blank the print jobs grid box.
-  - Click it to map ETABS output data to **SADS** data.
-  - Click it to save the data record that you have changed and close the active window.

## 2.3 Main Window

As you launch **SADS**, the first screen you see is the Main Window, it included three portions of content, first is the current project title, second is the Menu that helps you to do some procedure and the third is the button bar. The overview of this window shown as below.

Main window:



On the first portion of main window listed the project titles which have been previously created. **SADS** always shows the project title that you previously working on, if you want to change the project, you can choose Open Project command of the File menu.

The second portion of main window is the [menu bar](#), it listed the menus of **SADS**. It include File menu, Module menu and Help menu. The File menu is use to create project, change **SADS** folder and contain the common features on operating **SADS**, such as setup page, setup printer, pre-define key words and default range values of various tasks. The Module menu provides specific function that enable you to perform difference tasks of calculations, such as calculation of beams, slabs, columns etc... The usage of above menu will be briefly discuss in the button bar portion. The Help menu is one of the features of window.

The third portion of main window is the [button bar](#), it contains a series of buttons. You may use button to execute menu bar commands that name appears on the button. There are 3 groups of button bar in this portion:

**File Menu Button Bar:** It appears at the left side and contains following buttons:

-  - Open project button is used to select project that you want to working on, create a new project name, delete or amend the existing project name.
-  - Change folder button is used to define the folders of **SADS** system data, project data and user's data.
-  - Printer setup button is used to display Printer Setup dialog box. In this dialog box, you can change the parameters of your printer.
-  - Pre-define keyword button is used to define some words that will assist you decrease the repetition of typing those words in inputting data.
-  - Exit application button is used to terminate all project and exit **SADS**.

**Module Menu Button Bar:** It appears at the middle portion and contains following buttons:

-  - System command button: This command allows you to provide customize general data, and enables you to use the fundamental function as you execute **SADS**.

-  - Slab command button: This command allows you to provide the data of the slabs in the building and accomplish the calculations of the slabs by using the related sub-command which listed inside.
-  - Beam command button: This command provides a series of programs enables you to inputting data, amend data, validate data, generate beam sketch and calculate the reinforcement of beams.
-  - Column command button: Column command enables you to accomplish the calculation of the column.
-  - Beam-column Joint command button: In this command, you may collect and edit joint data, calculate and print design reports for submission.
-  - Analysis command button: Using this command, you may generate **SADS** data based on the output files of ETABS. Also, you may create the linking between **SADS** and ETABS for importing shears, moments and axial forces from ETABS to **SADS** database.
-  - Wall command button: This command allows you to calculate the reinforced concrete of core wall and shear wall. The related sub-command conduct the procedure from inputting data through calculating the reinforced concrete.
-  - Lintel command button: This command allows you to accomplish the calculation about the lintel beams in the building.
-  - Miscellaneous command button: This command allows you to perform the calculation of force coefficient, wind load, screen wall, corbel, etc.

**Sub-command Button Bar:** It appears at the right side, buttons are change to display sub-command that are applicable for execute menu commands.

## 2.4 Screen Viewer

When you run all the report sub-command, design sub-command or other sub-command that will perform printing job in **SADS**, **SADS** ask you to select the Print Mode options. If you select Print to File, **SADS** will display the print content to the screen.

Screen Viewer

BEAM DESIGN PROGRAM (BEAM-2004) Verion 3.0 BD Ref. No.: S0775

---

CONTINUOUS BEAMS :

Concrete : C40 fcu = 40  
 Main Bars: GRADE 460 fy = 460  
 Stirrup : GRADE 460 fvy = 460  
 Maximum Redistribution Factors: Hogging Moment = 10%, Sagging Moment = 0%

---

\* **1BX1** \* L = 12.000 Sec.= 800x1800

	Type	D.L.	L.L.	a	b	c
Own W.	Uniform	34.560	0.000	0.000	12.000	
100WALL	Uniform	6.360	0.000	0.000	12.000	
1S4	Triang.	14.160	22.500	6.000	6.000	
1B1	Concen.	43.843	53.036	3.000		

Page: 1 / 3

If the print content cannot be shown in a window, you may move the mouse cursor to print area, hold the left button down and drag the mouse up or down to view the content in invisible area.

You may click buttons on the top of window to perform following tasks:



Exit button is use to close the view file.



First Page button is use to turn to the first page of the print file.



Previous Page button is use to turn to the previous page of the print file.



Go To Page button allows you to specify the page of print file that you want to view.



Next Page button is use to turn to the next page of the print file.



Last Page button is use to turn to the last page of the print file.



Find Mark button allows you to specify a mark of **SADS** members and view the page that contains the mark.



Find Next button is use to find the next mark that you previously specified.



If the print content includes small characters and hard to read, to may click down this button to change the small characters to normal size characters.



Send the print file to printer.

## 2.5 Windows Size

**SADS** provides two kinds of window: sizable window and fixed size window.

The sizable window is displayed as below. You will find that the right bottom corner is marked with diagonal lines.



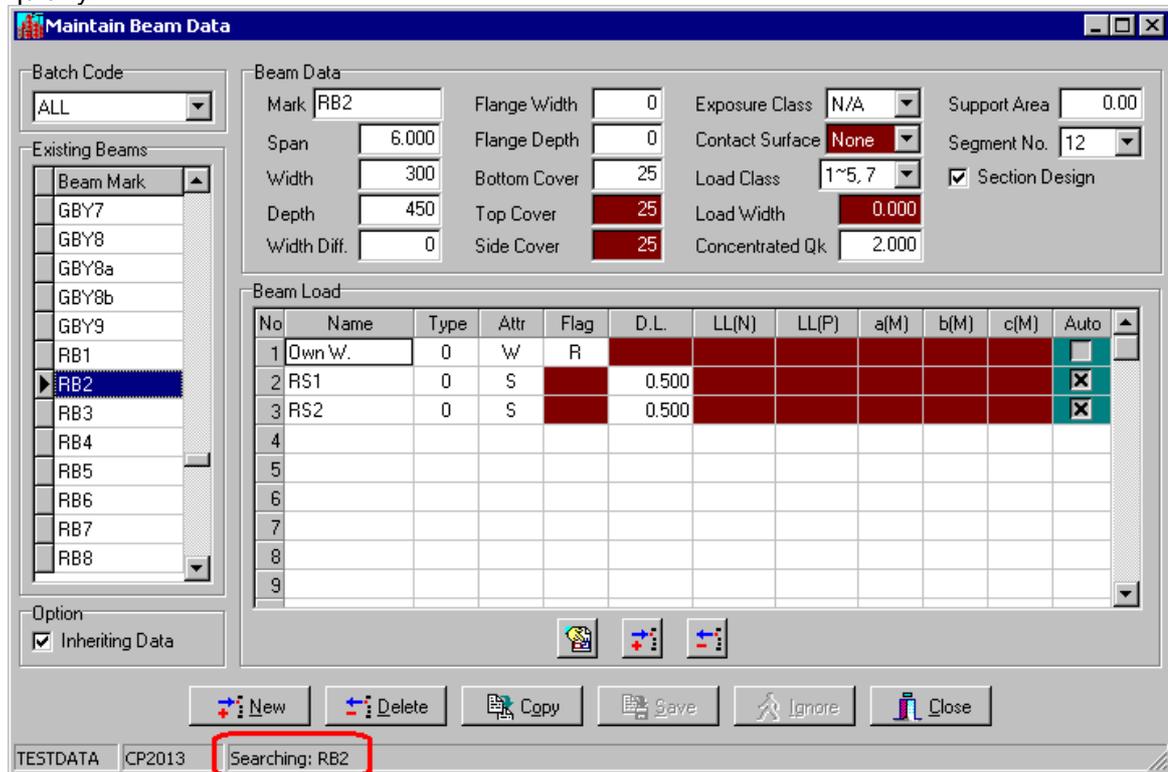
The fixed size window is displayed as below. There is no any mark on the window.



If you want to change the sizes of the sizable window, you can drag the edges or corners of the window. **SADS** will then display the new size of the window that you want for display more data as you like. Next time when you open this window **SADS** will remember the new size that you changed and display it.

## 2.6 Incremental Search

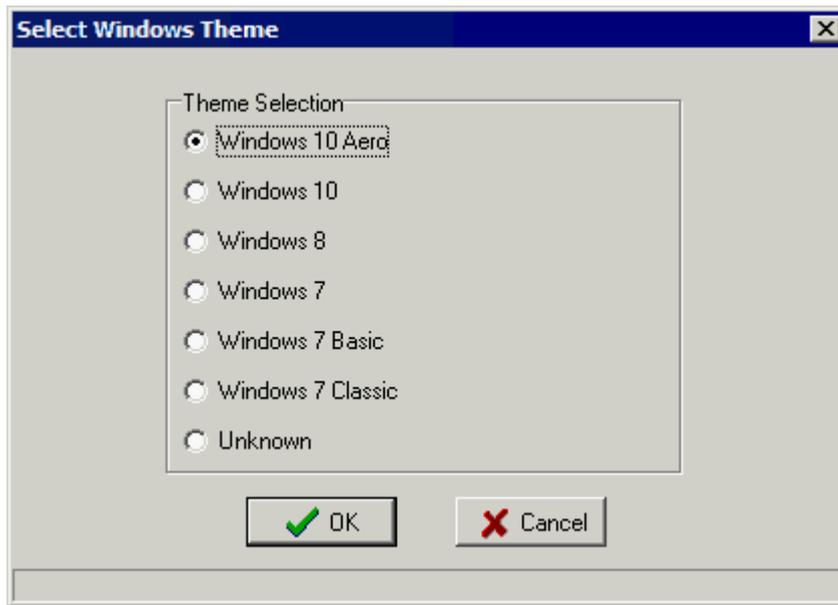
**SADS** provides incremental search in list boxes and combo box boxes. If you have many information in a list box or combo box, you can use this search method to search your data quickly.



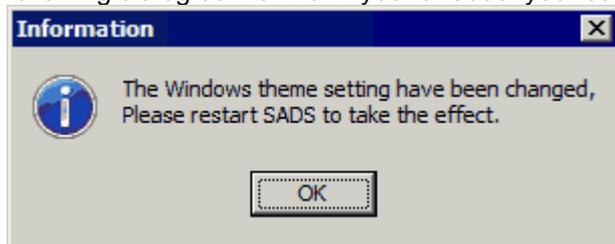
For example, you have many beam marks in Existing Beams list box and you want to search the beam RB2. You can highlight the Existing Beams list box type a character "R", the first beam mark with "R" in first character is highlighted. When you type one more character "B", the first beam mark with "RB" in first 2 characters is highlighted. After you type one more character "2", the RB2 beam mark is highlighted. The searching process is shown in the status bar in the bottom of window.

## 2.7 Windows Theme

There are many Windows themes in different Windows versions. These themes have different sizes and alignments. If the theme that you are using do not display window for **SADS** smoothly, you may try to click the Help menu item and select Windows Theme sub-menu to open the following window.



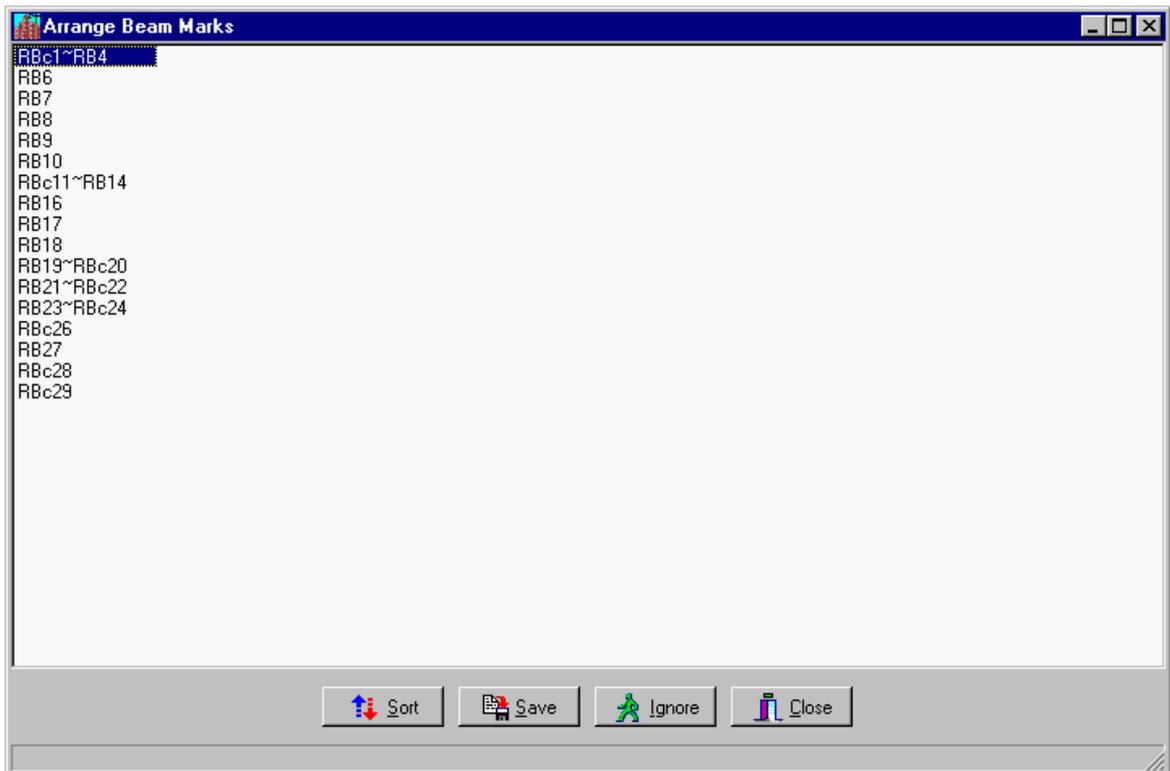
You can select one option that meet your theme and click the OK button. **SADS** will display the following dialog box to inform you to reboot your computer.



## 2.8 Re-arrang Marks

When you enter batch data, column data, wall data and lintel beam data, **SADS** will store these data based on the sequential order of your input. If your input order is not in correct sort order and you need to change this order, you can use the re-arrange mark function. If there is Arrange

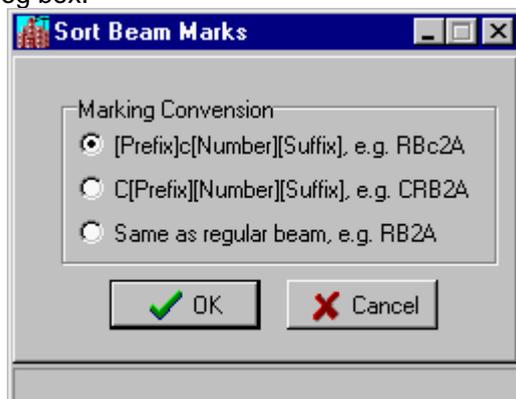
button  under the list box for marks, you can click this button to display the Arrange Marks window.



You have 2 choices to arrange these marks.

1. You can highlight a mark that to want to move and drag this mark to a new position. You may repeat these procedures until all marks are re-arranged properly.
2. You can click the Sort button to sort all marks automatically.

If you use the second choice and these marks are beam marks, **SADS** displays the following dialog box.



You need to select the marking convention of cantilever beams and click the OK button to sort all beam marks.

If you have following marks.

RB2, RB3, RBc1, RB2A, RB11, RB12, RB20 and RB25,  
the regular sorting order is shown as below.

RB11, RB12, RB2, RB20, RB25, RB2A, RB3 and RBc1.

**SADS** is using sorting order that mostly accepted in civic engineering. The sorting order is shown as below.

RBc1, RB2, RB2A, RB3, RB11, RB12, RB20 and RB25.

## 2.9 Database

In **SADS** previous version, we are using Paradox database and Borland database Engine (BDE) to manage all project data that used in **SADS**.

Starting SADS v20, we still use BDE. But, for the safety of our application, we are providing an alternative database -- Absolute Database (ABS). In case BDE to be discarded by MS Windows, SADS can continuously running by using ABS database.

Absolute Database is a BDE alternative database system. With Absolute Database you will not need special installation and configuration, it compiles right into your application.

In SADS v20, you will see there are 2 version of SADS in the setup CD. SADS v20 BDE version and SADS v20 ABS version.

All operations and screens of these 2 versions are total the same, except the Splash screen.

The Splash screen in BDE version in the same as SADS previous version.



The Splash screen in ABS version, there is an additional label "w/o BDE".



Also, there is an additional button labeled as "Single User".

ABD database has multi-user function. If the database is set to single user mode, this button is shown as Single User. If you want to switch to multi user mode, you can simply click this button, the label is changed to Multi User and ABS data is in multi user mode.

You can this multi user mode for group data entry. If you have a huge project and the data entry is a huge job, you can put your project data folder to shareable folder in your network. You can organize your team. Some body input slab data, some body input beam data, some body input column data, some body input wall data, and so on.

After all the data input are done, your supervisor can switch the ABS database to single user mode from his / her computer. This operation will stop other operators to alter the project data. The validation, pre-design and design sub-command should not be performed in multi user mode. These sub-commands take a little time only in single user mode. But, these sub-commands heavily read / write database, it is very slow if the mode is in multi user.

**NOTE:** If you run **SADS**, **BDIP**, **CDIP** and / or **SDIP** in the same computer at the same time, these applications will access the same project data. In this case, you need a multi user mode. You should set the ABS database to multi user mode.

## 3 Getting Start

### 3.1 Intergration in SADS

Now you already understand how **SADS** is structured. You are ready to use **SADS**. Familiarity with the following chapters and topics of the manual will be helpful in working with **SADS**. If you have used the earlier versions of **SADS**, you may not need to read this manual straight through, consult the table of contents to learn how to use the appropriate topic.

Since **SADS** is an integrated computer software, it is very important to keep the causal relation about the modules in order to operate properly. We suggest you follow the procedures listed below to complete a whole project.

1. The first thing you do is to create a new project name, you may use the [Open Project Command](#) of the File menu to provide the new job name.
2. Use [Master Data Sub-command](#) of the System Command to customize your project.

3. Use [Concrete Grade Sub-command](#) of the System Command to provide the stresses and elastic module of concrete that will be used in the project.
4. Use [Wind Analysis Sub-command](#) of the Miscellaneous Command to get result of force coefficient of the building. Continuing with [Wind Load Sub-command](#) of the Miscellaneous Command to calculate the wind loads at each floor level. At that point, you may supply the elevation data of whole building if you wish to use three dimensional analysis or supply elevation data of bent if you wish to use analysis by bent.
5. If you have ETABS mdb output file, use the [Generating SADS Data Sub-command](#) of the Analysis Command to map the ETABS mdb output data with **SADS** data and generate most important parts of SADS database. If your mdb file includes complete information, you may do less effort in following procedure 6 to 15.
6. Use [Batch Code Sub-command](#) of the System Command to provide the information of batch that will be used by slab data and beam data.
7. Use [Floor Data Sub-command](#) of the System Command to provide the floor information of the building.
8. Use [Maintain Slab Data Sub-command](#) of the Slab Command to supply the slab data, use [Validate Slab Data Sub-command](#) of the Slab Command to verify the data you entered and use [Design Slab Sub-command](#) of the Slab Command to pre-design slab data until the thickness of all slabs are okay!
9. Use [Maintain Batch Data Sub-command](#) of the System Command to enter batch data and associated beam data, then use [Maintain Beam Data Sub-command](#) of the Beam Command to enter beam data.
10. Use [Maintain Column Data Sub-command](#) of the Column Command to provide the column data.
11. Use [Validate Beam Data Sub-command](#) of the Beam Command to validate beams data and use [Validate Column Data Sub-command](#) of the Column Command to validate columns data. Meanwhile, you must correct the data according with the error messages given by **SADS**.
12. Use Maintain [Maintain Wall Data Sub-command](#) of the Wall Command to supply wall data, wall loads and wall sections.
13. Use [Validate Wall Data Sub-command](#) of the Wall Command to validate the wall data and use [Wall Section Properties Sub-command](#) to calculate the section properties of wall sections.
14. Use [Maintain Lintel Data Sub-command](#) of the Lintel Beam Command to supply lintel beam data, use [Validate Lintel Data Sub-command](#) to check the data you entered.
15. If you don't have ETABS mdb output file, you may use [Online Linking Data Sub-command](#) of Analysis Command to generate ETABS data based on **SADS** project data. Also, the mapping data between SADS and ETABS are created automatically. You can import the forces of beams, columns and walls from mdb output file of ETABS to SADS database. You can skip the procedure 16 and 17.
16. Use map function in [Linking ETABS Data Sub-command](#) of the Analysis Command to map between **SADS** data and ETABS data.
17. Use process function in [Link ETABS Data Sub-command](#) of the Analysis Command to use import the forces of beams, columns and walls from mdb output file of ETABS to SADS database.
18. Use [Design Beam Sub-command](#) of the Beam Command and select pre-design option to make sure the beam section is all right to against bending moment and shear, and calculate the fixed end moment and support shear.

19. Use [Take Column Loading Sub-command](#) of the Column Command to accumulate beam loads and columns own weight, use [Design Column Sub-command](#) of the Column Command to confirm the section of columns is not over maximum permissible ratio and to generate reinforced bar of columns at the mean time.
20. Use [Take Wall Loading Sub-command](#) of the Wall Command to accumulate labs loads, beam loads and wall own weight, use [Design Wall Sub-command](#) of the Wall Command to confirm the reinforced ratio of walls is less than maximum permissible ratio.
21. Use [Maintain Lintel Data Sub-command](#) of the Lintel Beam Command to supply lintel beam data, use [Validate Lintel Data Sub-command](#) to check the data you entered and use [Design Lintel Beam Sub-command](#) to pre-design lintel beam. If the reinforced ratio of lintel beam is over maximum permissible ratio, you should adjust lintel beam section and do pre-design again until it was okay.
22. If you have adjusted sections in procedure 17 to 20, you should use process function in [Link ETABS Data Sub-command](#) of the Analysis Command to update the ETABS e2k input file. You should run ETABS application to get a new mdb output file and repeat the procedure 16 to 20 until all sections are OK.
23. Use [Collect Joint Data Sub-command](#) of the Beam-column Joint Command to collect the beam-column joint data from beam and column data, use the [Edit Joint Data Sub-command](#) to edit the level of connected beams on the column for designing beam-column joints.
24. Use [Design Joint Sub-command](#) of the Beam-column Joint Command to pre-design the beam-column joints.
25. Use [Edit Joint Bar Sub-command](#) of the Beam-column Joint Command to edit the bar information of beam-column joints.
26. Design all elements of the structure for the submission to B.D. Use the Slab, Beam, Column, Beam-Column Joint, Wall, Lintel Beam, Screen Wall, Tank Wall and Corbel design sub-command in the corresponding commands for above purposes. **Important tips:** before you print design report of slab, beam, column, beam-column joint, wall and lintel beam for submission to BD, we highly recommend you to run design sub-command with check reinforcement option to make sure your final section and reinforcement are meet the requirement of CoP2013. Otherwise, you must adjust all reinforcement that under designed before the printing job be started.

## 3.2 Regulation Code

SADS follows regulation codes listed below.

- Code of Practice for Structural Use of Concrete 2013 - CoP2013.
- Amendments to Code of Practice for Structural Use of Concrete 2013.
- Code of Practice for Dead and Imposed Load 2011 - CoP 2011.
- Code of Practice on Wind Effects in Hong Kong 2004 - Wind 2004.
- Practice Note for Authorized Persons and Registered Structural Engineers 173 - PNAP 173.

## 3.3 Prior Acceptance Programs

SADS has following prior acceptance programs.

- BEAM DESIGN PROGRAM (BEAM-2013) Version 5.0, BD Ref Number is S0919;
- COLUMN DESIGN PROGRAM (COLUMN-2013) Version 5.0, BD Ref Number is S0920;
- WALL DESIGN PROGRAM (WALL-2013) Version 5.0, BD Ref Number is S0921;
- BEAM-COLUMN JOINT DESIGN PROGRAM (JOINT-2013) Version 1.0, BD Ref Number is S1012;
- GRAVITY LOAD COLLECTION PROGRAM (LOAD-2013) Version 1.0, BD Ref Number is

S1016.

### 3.4 Example Project

There are examples of projects in installation file. You can run these projects from [Open Project Command](#). The main example project is TESTDATA. All screens displayed in this help file or user's manual are captured from this project. You may look these screens to understand how to prepare data for your project.

1. The framing plan of this project can be displayed by clicking the Framing button in [Function page](#) of Generate **SADS** Data Sub-command.
2. There is alternate floor below 1ST. FLOOR.
3. There is extended column C6 at 13TH FLOOR.
4. There are columns C4 and C8 have different Hx and Hy at ROOF FLOOR to 12TH FLOOR.
5. There are columns C2, C4, C5 and C9 are terminated at 1ST. FLOOR and supported by girders at 1ST. FLOOR.
6. These columns are resumed from GRD. FLOOR to footing.
7. The permanent imposed load are applied to 13TH FLOOR.
8. The dynamic vertical load are applied to 2ND. FLOOR.
9. The vehicle loading -- class 6B are applied to GRD. FLOOR.
10. The uplift loading are applied to BASEMENT.
11. There soil, wind and dynamic lateral load applied to the building structure.
12. The project data includes ETABS input file MODEL.EDB and output file MODEL.MDB and MODEL.E2K. You may review this input file to understand how to prepare ETABS model for linking to **SADS**.

The other projects HANDMAP, SMARTMAP, TESTGEN, TESTLINK and TESTRAMP are examples of generating **SADS** data and linking ETABS data. Please refer to document "**SADS** Demonstration Version 19".

If you are interesting with ETABS online linking. you can use TESTDATA. Please refer to document "**SADS** Online Link Demonstration".

When you run these examples, you may add , change and / or delete project data. If you want to get the original project data after you modified it, you can run [Restore Data Sub-command](#) from BACKUP folder in [Project List Folder](#).

### 3.5 Limitation

The limitation of **SADS 20** are listed as below.

Maximum character number of batch code	4
Maximum number of concrete grade	25
Maximum batch number in project	30
Maximum number of floor	120
Maximum character number of slab mark	10
Maximum slab number in project	No limit
Maximum character number of beam mark	10
Maximum beam number in project	No limit
Maximum batch data number in one batch code	2000
Maximum span number of continuous beam	48
Maximum load number of beam	40
Maximum associated beam in a girder	10
Maximum character number of column mark	8
Maximum column number in project	No limit
Maximum connected beam to column	8
Maximum character number of wall mark	8
Maximum wall number in project	No limit
Maximum load number of wall in a floor	250
Maximum element number of wall section	200

Maximum character number of lintel mark	8
Maximum lintel number in project	No limit
Maximum load number of lintel beam	20
Maximum character number of corbel mark	10
Maximum load number of corbel	8
Maximum character number of wind load	10
Maximum bay number of wind load data	30
Maximum line in ETABS frame	1999
Maximum column in ETABS frame	350
Maximum bay number in ETABS frame	900
Maximum area number in ETABS	1500

### 3.6 Import Memo

1. When **SADS** is in progress, the computer should never be turned off or re-boot by any means especially when you are inputting data. If so, the data files can be damaged.
2. Every data processing system runs at the risk of partial or total loss of data due to power failure, hardware breaks down and human error. So, after you have input certain amount of data, we highly recommend you to backup all your data files. You may use [Backup Data Sub-command](#) and [Restore Data Sub-command](#) to back and restore your project data easily.

### 3.7 Permissions for Windows Users

If you have installed **SADS** and you don't assign your end users as administrator, you must set the necessary permissions for your end users.

**Folder Permission:** There are 3 folders in **SADS**, you need to set the permissions for your end users. The permissions should be set as below:

System Data Folder - Read only.

Project List Folder - Full control.

User Access Folder - Full control.

BDE Folder - Full control. Usually, the BDE folder is located at c:\program files\command files\Borland Shared\BDE on Windows XP, c:\program files(x86)\command files\Borland Shared\BDE on Windows 7, Windows 8 or Windows 10.

**Registry Key Permission:** **SADS** uses registry keys in Windows to control the program processing. In Windows XP, Windows 7, Windows 8 or Windows 10, the following registry keys must be set to "full control" permission for you end users who do not be assigned as administrator.

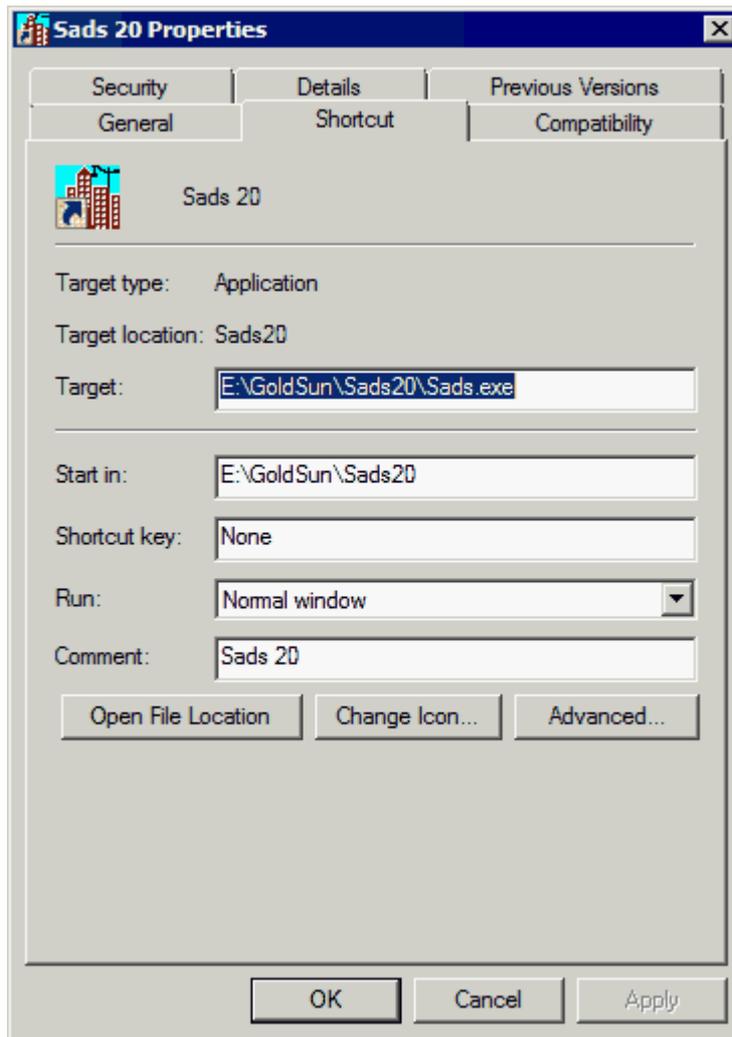
HKEY\_USER\DEFAULT\Software\**SADS20**;

HKEY\_LOCAL\_MACHINE\SOFTWARE\Borland\Database Engine (on Windows XP)

HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Borland\Database Engine (on Windows 7, 8 or 10).

There are 3 methods to set these permissions.

1. You can run Permission.exe that located in Program Folder of **SADS 20**. Before you run this utility, you can read Permission.pdf in the same folder. All processing are automatic.
2. You can perform the procedures for setting permissions manually. Please refer to **SADS 16** User's Manual.
3. After you install **SADS**, you may right click the **SADS** icon and select Properties item to display the **SADS 20** Properties dialog box.



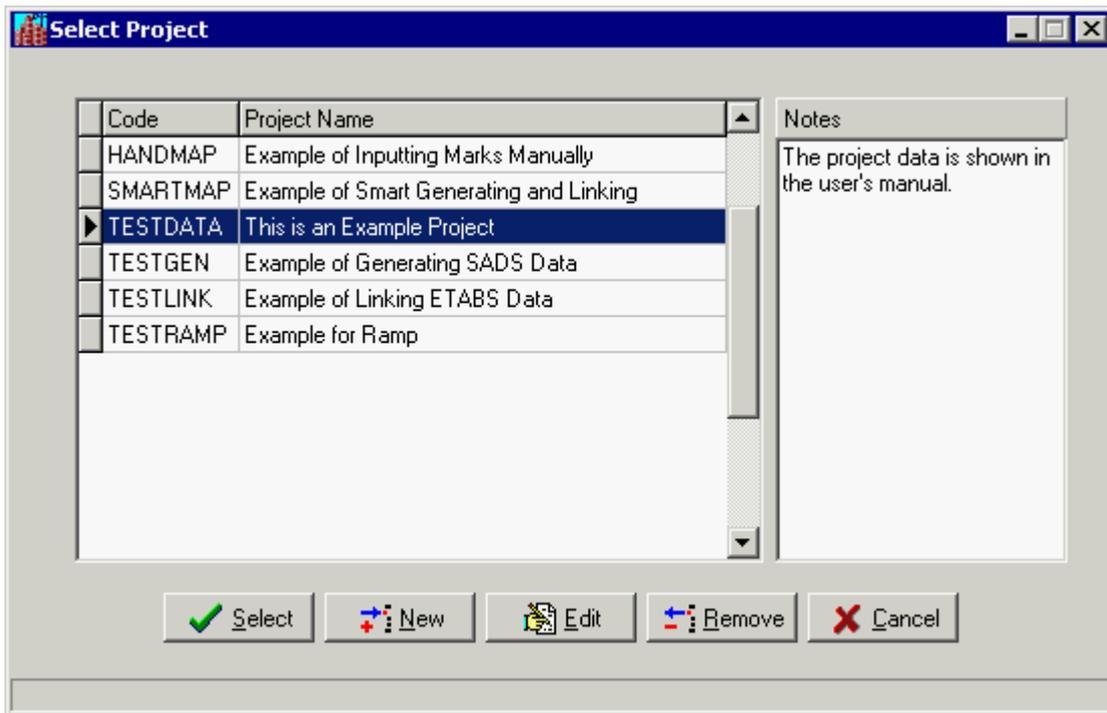
Select Compatibility TAB and check the Run this program as an administrator check box. Click Apply and OK buttons.

## 4 File Command

### 4.1 Open Project Command

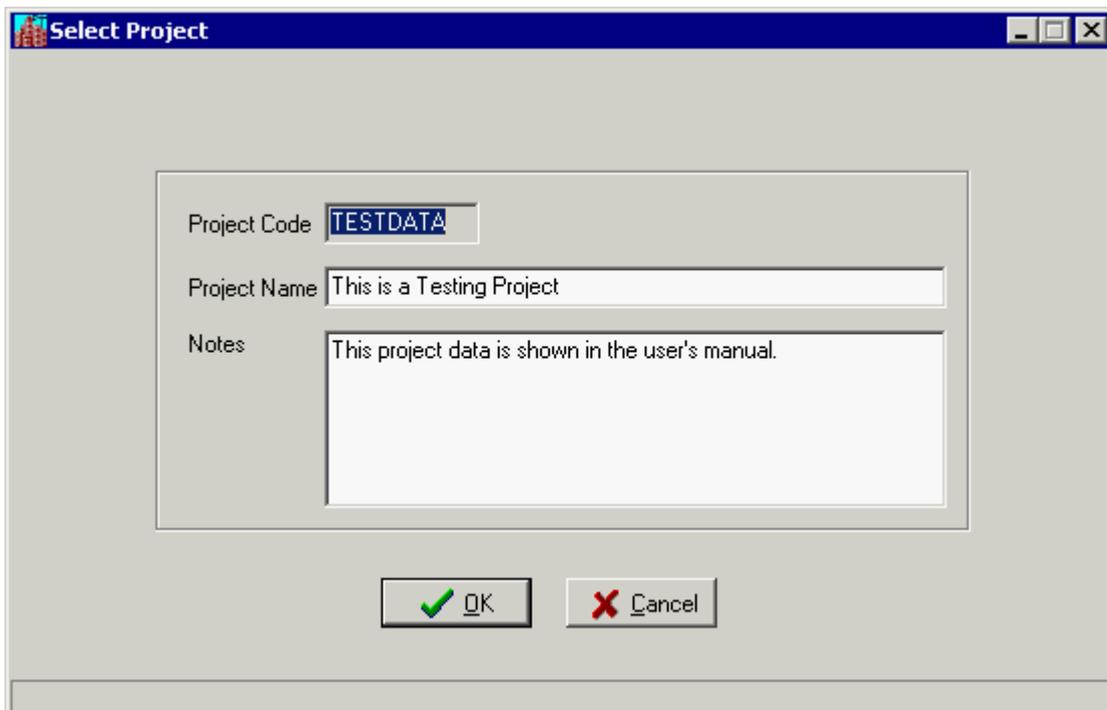
When you start working on **SADS**, **SADS** will open the project that last time you processed. You may go through the procedure of the tasks or create a new project.

If you want to change the project, you may choose Open Project from File menu or click  button on [File menu Button Bar](#), **SADS** displays Open Project as below.



There is a listing of all projects that you created previously. **SADS** allows user to initiate them one at a time by using the buttons at the lower part of the window.

If you want to select another project, highlight that project and click Select button, or double click that project to advance to the desired project. If you want to add a new one or edit the existing one click New or Edit button, **SADS** will display project data window as below. You may input the information of new project or change the information of the existing project. If you want to remove the existing one click Remove button, **SADS** will pop a dialog box prompt you to confirm, you may click "Yes" to confirm, then **SADS** will remove the project from the listing. Otherwise click "No" to deny it. If you want to get back to previous project, click Cancel button.



**Project Code** - Enter the alphanumerical up to 8 characters long for the name of folder which store the data tables of the corresponding project.

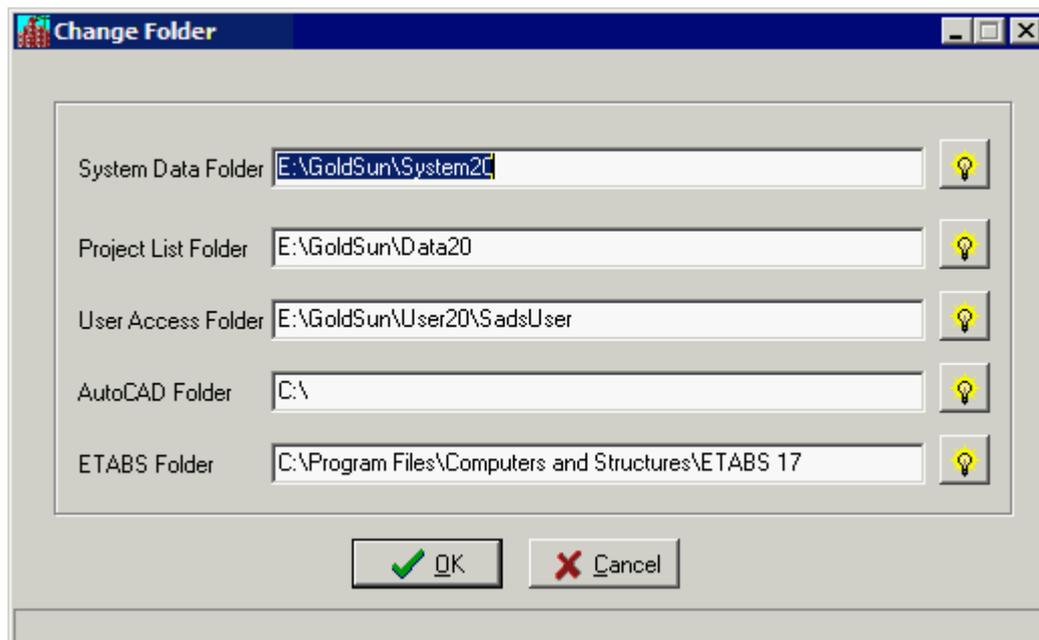
**Project Name** - Enter the alphanumerical up to 40 characters long for the name of the project.  
**Notes** - Enter any comment for the project.

Click **OK** button to create a new project or change the information of existing project. Click **Cancel** button to cancel the operation and close the window.

## 4.2 Change Folder Command

**SADS** database tables are stored into 3 folder: project folder, system folder and user folder. The default folders are defined in installation program. If you want to change these folders, you may

choose Change Path from File menu or click  button on [File menu Button Bar](#), **SADS** will display the Change Path as below.



**System Data Folder:** The folder which stores system table that hold system information of **SADS**. It can be put to network server and shared by all users. But, it is recommended to put the folder to local computer for better performance.

**Project List Folder:** The folder which stores project list table and project data folders that hold data tables of each project. It is share folder and can be put to network server.

**User Access Folder:** The folder which stores all temporary tables and files. It is private folder and must be put to local computer.

**AutoCAD Folder:** The folder which stores the window version of AutoCAD.

**ETABS Folder:** The folder of available and accepted ETABS program.

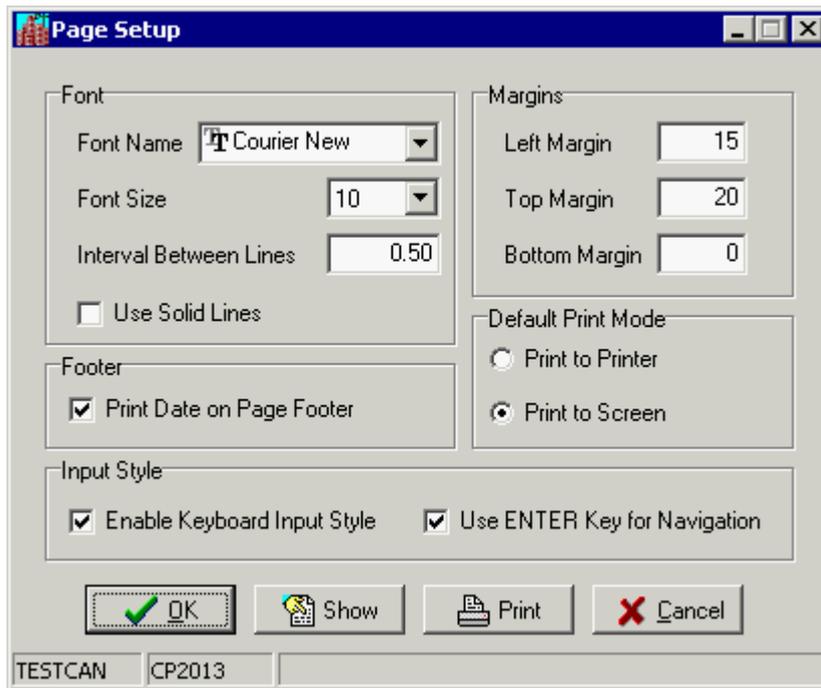
You may click  button to browse the existing folders. Click **OK** button to change the folders or click **Cancel** button to keep the original folder.

**Note:** If these folders is use on network server or on Windows NT work station, the network administrator should define [permission](#) of the folder for the end users.

## 4.3 Page and Input Setup Command

The Page Setup command is use to customize the layout of all the print out of **SADS**.

when you choose Page Setup from File menu, **SADS** will display the Page Setup as below.



**Font Name** - Click the combo box and select the fixed font name as you wish. **SADS** retrieved all the fixed font names that installed to Windows in the combo box, you may select one of these fonts for viewing and printing reports in **SADS**.

**Font Size** - Click the combo box and select the pixel size of your print out.

**Interval** - Enter the value (in mm) of interval between rows of printout.

**Use Solid Line** - Check the check box if your printer can print solid line.

**Footer** - Check the check box if you wish to print the date on the bottom of the printout paper.

**Left Margin** - Enter the value (in mm) of the left margin of your printout paper.

**Top Margin** - Enter the value (in mm) of the top margin of your printout paper.

**Bottom Margin** - Enter the value (in mm) of the bottom margin of your printout paper.

**Default Print Mode** - Select the default [print mode](#) when you print reports in all commands.

**Enable Keyboard Input Style** - **SADS** is Windows application. When we input project data, we need to use keyboard and mouse interactively. Usually, we need to input large amount of data to a project, especially when it is a large project. When you check the "Enable Keyboard Input Style" check box, you can input data using keyboard only for increasing the performance of your work. This input style is similar to **SADS** v6 - MS-DOS version. Currently, we implement this input style to slab data and beam data. If it is really helpful, we can extend this input style to other data input.

**Use ENTER Key for Navigation** - If you check this check box, **SADS** uses ENTER key to navigate the focus of input control, e.g. edit box, check box, radio button, list box, etc. Otherwise, **SADS** uses TAB key for this processing.

After finish the data input of this command, click Show button to show the effect of font that you selected, click Print button to print a test page to check the margin, footing, etc., click Ok button to save it or Cancel button to deny it.

## 4.4 Print Setup Command

**SADS** offers several options for printing your report. You can modify these options using this command.

You can choose Print Setup from File menu to display Printer Setup dialog box. This is one feature of the Window common dialog boxes. Unlike the other command dialog boxes, however, there is relatively little interaction between **SADS** and the dialog box. The dialog boxes are different according to the type of the printers.

## 4.5 Pre-defined keyword Command

Pre-defined keyword Command allows you to define key strokes to function key F1 to F10 that will assist you to decrease the repetition of typing the same words in input data sub-commands.

When you choose Pre-defined Keywords from File menu or click  button on [File menu Button Bar](#), **SADS** will display the Pre-defined Keywords as below.

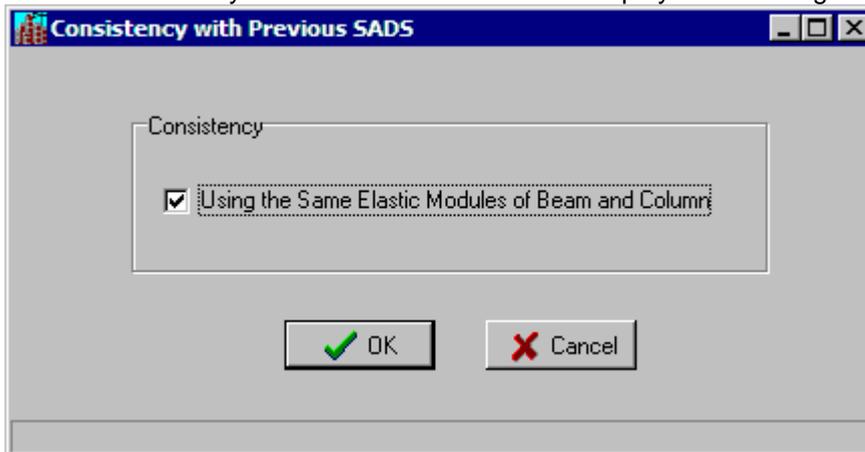


You may enter up to 8 characters long for each keyword. **SADS** will save the keywords to user folder and retrieve these keywords when you open the window next time or for next project. When you click any string edit box in any input data sub-command, you can press Ctrl and appropriate function key to copy the keywords to the edit box.

## 4.6 Consistency with SADS Previous Version

In **SADS** previous version, the elastic modules of beam and column are taken as the same value. Starting from **SADS** v20, the elastic modules are taken based on the grade of concrete in beam and column.

If your running existing project data and prefer to keep the previous calculation results, you may run the Consistency Command in File menu and display the following dialog box.

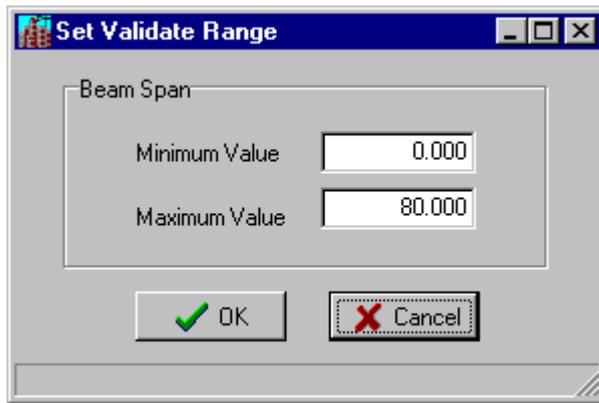


You can check the Using The Same Elastic Modules of Beam and Column check box. **SADS** can run previous project data based on the previous setting.

## 4.7 Set Range Checking Command

In **SADS**, all the inputting data such as slab data, beam data, column data, wall data, lintel beam data, wind data, etc.. should have they own minimum value and maximum value for the usage of range validation. **SADS** set these default range values in the numerical edit box of correspondence Command command (e.g. Slab command, Beam command, etc.). If you want to modify the default range value of them, enter the edit box then press the function key **F9**.

For example, if you want to modify the default range value of beam span, you can click the edit box of beam span in [Beam Data Sub-command](#) and press **F9**. A range value dialog box will be displayed. You may click the edit box and enter the values you want, then click OK button to save it. The following figure shows the range value dialog box of beam span.



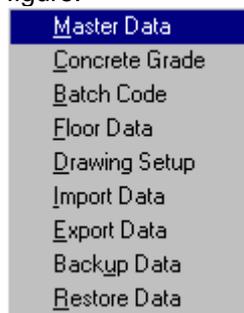
Same as above, if you want to modify the default value of beam width, beam depth or others numerical edit box of the input data, just click the numerical edit box and press **F9** key.

## 5 System Command

### 5.1 About System Command

In the System Command, **SADS** provides a series of Sub-command options allow you to customize the master data of an individual building, the batch data, the floor data and the concrete mix. Besides **SADS** offers the fundamental functions to meet the needs of the users in execute **SADS**. The primary options of these functions are page set up, drawing set up, import and export data.

When you choose System from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button of the Module menu button bar, the system sub-command buttons are displayed as below.

System Sub-command Buttons.



The Sub-commands are:

1. Mastering Data Sub-command.
2. Concrete stresses Sub-command.
3. Batch Code Sub-command.
4. Floor Data Sub-command.
5. Drawing set up Sub-command.
6. Import Data Sub-command.
7. Export Data Sub-command.
8. Backup Data Sub-command.
9. Restore Data Sub-command.

## 5.2 Master Data Sub-command

### 5.2.1 About Master Data

In the Master Data sub-command, **SADS** allows you to select the method you wish, also **SADS** provides the default values that defined in Code of Practice of Hong Kong and gathered the particular data which going to be shared in input data or calculate data.

When you choose Master Data from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display Master Data as below.

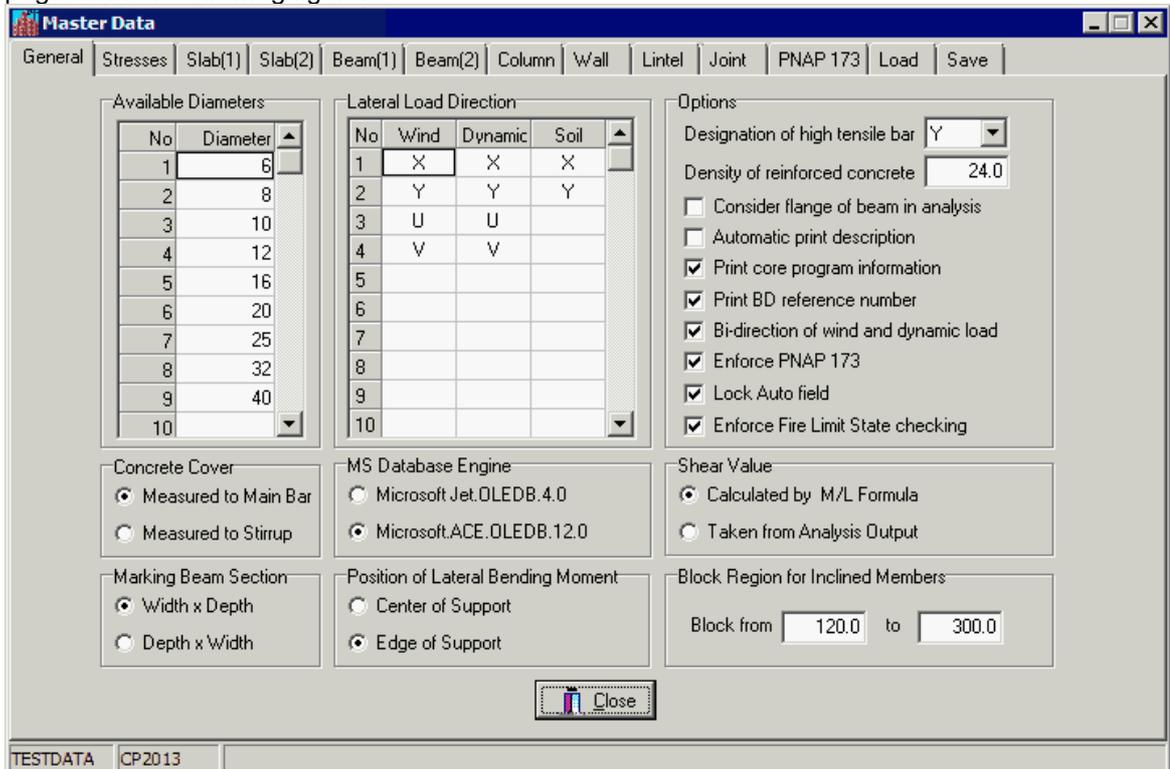


There are 12 pages in the Master Data:

1. General page.
2. Stresses page
3. Slab (1) page.
4. Slab (2) page.
5. Beam (1) page.
6. Beam (2) page.
7. Column page.
8. Wall page.
9. Lintel page.
10. Joint page.
11. PNAP 173 page.
12. Load Page.
13. Save page.

### 5.2.2 General Page

When you click the General page of Master Data sub-command, **SADS** will display the General page as in the following figure.



**Available diameters** - Enter the available diameters of steel bars that provide in the market, according to the ascending sequences of numerical characters.

**Concrete Cover** - Click the Measure to Main Bar radio button if you define the concrete cover to be measured to main bar. Click the Measure to Stirrup radio button if the concrete cover is measured to stirrup.

**Marking Beam Section** - Click the radio button of Width x Depth if you want to display or print the beam section by BxD. Click the radio button of Depth x Width if you want to display or print the beam section by Dx B.

**Lateral Load Direction** - You may define up to 26 directions of wind, dynamic and soil loads. You should use one upper case character to denote each direction of lateral load.

**MS Database Engine** - If the Microsoft.ACE.OLEDB.12.0 is installed to your computer, you should select this engine. If you have only Microsoft.Jet.OLEDB.4.0 in your computer, you can select this engine. But, you may not able to handle newer version of Microsoft Access database.

**Position of Lateral Bending Moment** - Click the Center of Support option if the lateral moment is on the support center. Click the Edge of Support if the lateral moment is on the edge of support.

**Options:**

**Designation of high tensile bar** - Click the Combo box and select "Y" or "T".

**Density of reinforced concrete** - Enter the desired value of reinforced concrete for calculate the self weight of slab, beam, column, wall and lintel beam of the building.

**Consider flange of beam in analysis** - Check the check box if you want to consider the flange effect of the framed beams.

**Automatic print description** - Check the check box if you want if you want to print the description of the calculation report of relevant tasks (e.g. beam, slab, wall, etc.).

**Print core program name** - Check the check box if you want to print the names of core programs to the header of each printing page.

**Print BD reference number** - Check the check box if you want to print BD reference numbers of core programs to the header of each printing page.

**Bi-direction of wind and dynamic load** - Check the check box if you want each direction of wind load and dynamic load applies to building in both normal direction and reversed direction.

**Enforce PNAP 173** - Check the check box If will to follow the Practice Note for Authorized Persons and Registered Structural Engineers 173 - PANP 173 of Hong Kong B.D.

**Lock Auto field** - When you use Generate **SADS** Data Sub-command to generate your project data, **SADS** sets the "auto generated" flag to TRUE in batch code data, slab data, beam batch data, beam load data, column data, column beam data, wall data, wall data, wall load data, lintel data and lintel load data. After your project data is generated, you need to provided data that not included in ETABS output file. All data that input by users, the auto generated flag is set to FALSE automatically. **SADS** shows these flag on appropriate data entry form and users should not to alter these data. So, the check box is checked by default and all flags are shown as read only. In case, you need to change the value the flag, you can un-check the check box temporarily.

**Enforce Fire Limit State checking** - According with Clause 2.1.2 and 2.2.3 in CoP2013, we should check the our structures by Fire Limit State. This check box should be checked to inform **SADS** to perform this checking. If you are sure that your structure can be skipped from this checking, you may un-check this check box.

**Shear Value** - If you click Calculate M/L radio button, the shears of beams and columns are calculated according to formula M/L, click Analysis Output radio button, these shears are taken from output of analysis program.

**Blocked Region for Inclined Member:** You should enter the starting angle and the ending angle of block region. The default is 120 degrees and 300 degrees.

### 5.2.3 Stresses Page

When you click the Stresses page of Master Data sub-command, **SADS** will display the Stresses page as below.

The screenshot shows the 'Master Data' window with the 'Stresses' tab selected. The interface is organized into several sections:

- Characteristic Strength:** A table for defining steel grades and their yield strengths (Fy).
 

	Grade	Fy
High tensile steel	500C	500.0
Mild steel	250	250.0
- Partial Safety Factors:** A table for defining safety factors for ULS and FLS.
 

	ULS	FLS
For concrete (flexure)	1.500	1.100
For concrete (shear)	1.250	1.100
For steel bars	1.150	1.000
- Elastic Module:** A single input field for steel bars, set to 200000 N/mm<sup>2</sup>.
- Load Factors (ULS):** A table for defining load combination factors for ULS.
 

	Dead	Imposed	Earth	Wind
D.L.+L.L.+Soil	1.40	1.60	1.40	N/A
D.L.+Soil+Wind	1.40	N/A	1.40	1.40
D.L.+L.L.+Soil+Wind	1.20	1.20	1.20	1.20
- Load Factors (FLS):** A list of load factors for FLS.
 

Dead load	1.00
Permanent live load, escape stairs and lobbies	1.00
Non-permanent Live load in all other area	0.80
Soil loads	0.80
Wind loads	0.33

At the bottom of the window, there is a 'Close' button and a status bar showing 'TESTDATA CP2013'.

#### Characteristic Strength;

**High tensile steel** - Enter the label and characteristic strength of high tensile steel.

**Mild Steel** - Enter the label and characteristic strength of mild steel.

#### Partial Safety Factor:

**For concrete (flexure)** - Enter the partial factor of safety applied to the flexure strength of concrete for ULS and FLS.

**For concrete (shear)** - Enter the partial factor of safety applied to the shear strength of concrete for ULS and FLS.

**For steel bar** - Enter the partial factor of safety applied to the strength of steel for ULS and FLS.

**Elastic module of steel bar** - Enter the value of elastic module of steel bar (in N/mm<sup>2</sup>).

**Load Factors (ULS)** - Enter the load combination factors for ULS according to Table 2.1 in Clause 2.3.2.1 of CoP2013 or your experience. The load combinations are include D.L.+L.L.+Soil, D.L.+Soil+Wind and D.L.+L.L.+Soil+Wind.

**Load Factors (FLS)** - Enter the load factors for FLS according with Table 2.2 in Clause 2.3.2.7 of CoP2013.

## 5.2.4 Slab (1) Page

When you click the Slab (1) page of Master Data sub-command, **SADS** will display the Slab (1) page as in the following figure.

### Main Bars:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the main bars.

**Valid diameter of main bars** - Click the Combo box to select the value (in mm) of the minimum and maximum diameter of the main bars.

### Distributed Bars:

**Bar type** - Same as above, Click the radio button for choosing high tensile steel or mild steel for the distributed bars.

**Valid diameter of distributed bars** - Click the Combo box to select the value (in mm) of the minimum and maximum diameter of the distributed bars.

### Minimum Reinforcement Ratio:

**Main bars** - Enter the minimum percentage (in %) about the area of main bars / the gross cross-sectional area of the concrete.

**Distributed bars** - Enter the minimum percentage (in %) about the area of distributed bars / the gross cross-sectional area of the concrete.

**For crack checking** - Enter the percentage (in %) of minimum reinforcement ratio of the main bars on cracking design.

**Loading shape of two Ways slab** - Click the radio button to select the load distribution as trapezoidal / triangular or rectangular.

### Options:

**Multiple Concrete Cover** - If you check the Multiple concrete cover check box, you can enter 2 different concrete covers in one slab section, bottom cover and top cover. If you prefer to have only one concrete cover in same slab section, you should not check the check box.

**Transfer partition load** - Check the check box if you wish to transfer the partition loads of slabs automatically towards the appropriate beams. Otherwise you may enter the partition load to the relevant beam loading.

**Check deflection** - Check the check box if you wish to print out the span/effective depth ratio of slab deflection for checking purpose.

**Allowance of bar area** - Enter the allowance coefficient of main bars area, the allowance factor you provided will get result in increasing the bar area automatically when **SADS** provides the reinforced bar of the slabs by adjusting bar diameter, bar number and bar

spacing.

**Bar Spacing:**

**Maximum spacing of main bars** - Enter the maximum pitch of main bars. Either to times of slab effective depth ( $d_1$ ) or the absolute value in mm.

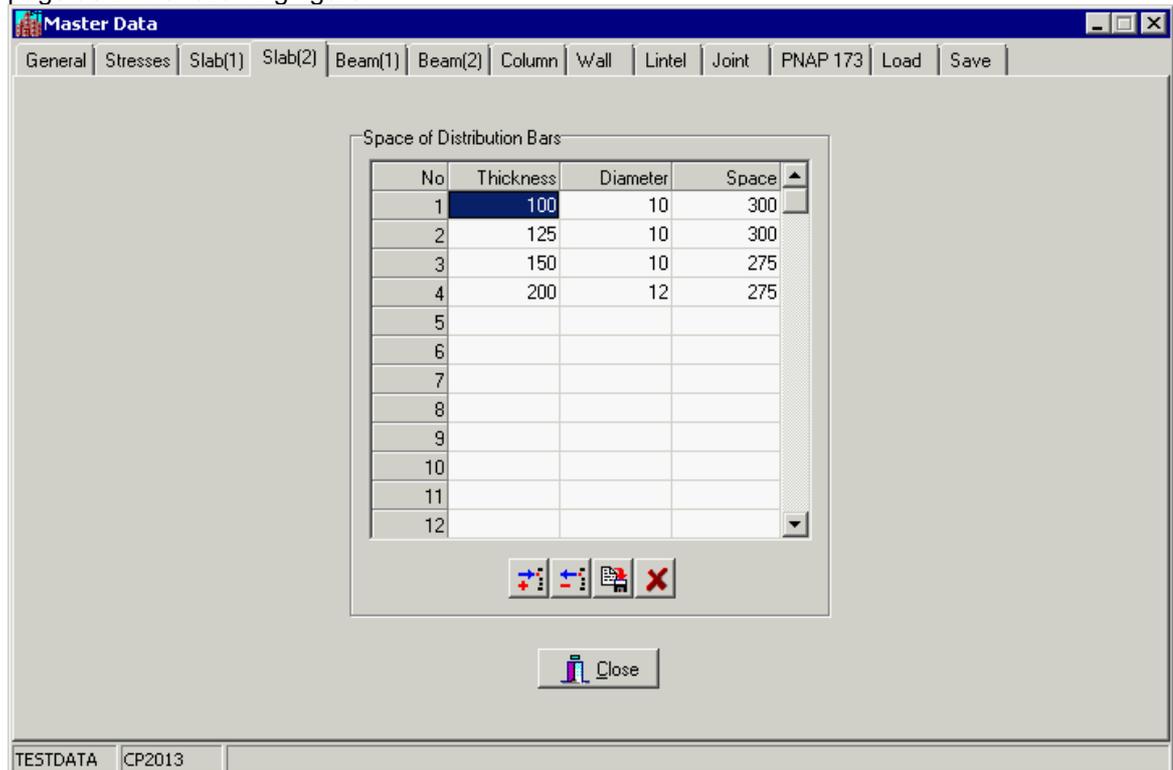
**Minimum spacing of main bars** - Enter the minimum pitch of main bars. Either to times of main bar's diameter ( $D_m$ ) or the absolute value in mm.

**Maximum spacing of dist. bars** - Enter the maximum pitch of distribution bars. Either to times of slab effective depth ( $d_1$ ) or the absolute value in mm.

**Increment of spacing** - Enter the increment value (in mm) of the space between main bars.

## 5.2.5 Slab (2) Page

When you click the Slab (2) page of Master Data sub-command, **SADS** will display the Slab (2) page as in the following figure.



**SADS** provides the options for defining the diameter and spacing of distribution bar of one way slab, if you do not want to define them by yourself, you may skip this entry, **SADS** will define them according to the Regulation.

**Thickness** - Enter the thickness (in mm) of the slab.

**Diameter** - Enter the diameter (in mm) of distribution bar you wish.

**Space** - Enter the spacing (in mm) of distribution bar you wish.

## 5.2.6 Beam (1) Page

When you click the Beam (1) page of Master Data sub-command, **SADS** will display the Beam (1) page as in the following figure.

**Transfer Mechanism - SADS** provided three choices of the transferring loads, (1) Simply supported, (2) All spans loaded, (3) Critical loaded. Click the radio button for what you want.

### Moment Factors:

**For column support** - Enter the moment factor of column support. **SADS** defined the range of support factor is 0.0 to 1.0, depend on the point of hogging moment you selected. "0.0" indicates the point is at the center of the support, "1.0" indicates the point is at the edge of the support. **SADS** suggests 0.666 for the factor of column, you may enter the value you wish.

**For beam support** - Enter the moment factor of beam support. **SADS** defined the range of support factor is 0.0 to 1.0, depend on the point of hogging moment you selected. "0.0" indicates the point is at the center of the support, "1.0" indicates the point is at the edge of the support. **SADS** suggests 0.0 for the factor of beam, you may enter the value you wish.

### Redistribution Factors:

**Hogging moment** - Enter the maximum redistribution factor of hogging moment.

**Sagging moment** - Enter the maximum redistribution factor for sagging moment.

### Main Bars:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the main bars.

**Preferred diameter of bars** - Click the combo box and select the diameter of main bar (in mm) you wish to use in calculation, this value is use to estimate the effective depth of beams in pre-design and design programs. But in generate beam sketch program, **SADS** will according the actual requirement of calculation to determine the diameter of main bar.

**Minimum horizontal clear space of main bars** - The horizontal clear space of main bars is stipulated not smaller than the diameter of bar. So the default value adopted by **SADS** is same as the diameter of the bar separately at top level and bottom level. If you want to change these value, you may enter the top and the bottom value separately in the appropriate box.

**Minimum vertical clear space of main bars** - The vertical clear space of main bars is stipulated not smaller than the diameter of bar. So the default value adopted by **SADS** is same as the diameter of the bar separately at top level and bottom level. If you want to change these value, you may enter the top and the bottom value separately in the appropriate box.

**Minimum diameter of main bars** - Click the combo box and select the minimum diameter of the main bar you wish (in mm).

**Minimum rein.ratio of main bars** - Enter the minimum percentage (in %) about the area of tensile bars / the gross cross-sectional area of the concrete.

**Maximum rein.ratio of main bars** - Enter the maximum percentage (in %) about the area of compressive bars / the gross cross-sectional area of the concrete.

**Diameter of hanger bars** - Click the combo box to select the diameter (in mm) of hanger bar.

**% of hanger bars** - Enter the minimum percentage (in %) about the area of hanger bars / the largest end top bar area.

#### Stirrup:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the stirrups.

**Diameter** - Click the combo box and select the value (in mm) of the minimum and maximum diameter of the stirrups you wish.

**Minimum rein.ratio** - Enter the minimum percentage (in %) about the area of stirrups / the horizontal area of the concrete at that section.

**Maximum spacing** - Enter the maximum pitch of stirrups. Either to times of beam effective depth (d1) or the absolute value in mm.

**Minimum spacing** - Enter the minimum pitch of stirrups. Either to times of stirrup diameter (Dm) or the absolute value in mm.

**Increment of spacing** - Enter the increment value (in mm.) of the space between the stirrups.

## 5.2.7 Beam (2) Page

After supply all the relevant value of Beam(1) page, click the Beam (2) page of Master Data sub-command to continue to supply the values on this page. The figure of the Beam (2) page is as below.

#### Sketch Generation Options:

**Digit of breaking point of bar** - Enter "1" or "2" for the places of decimals.

**Unify diameter of reinforced bars** - If you want to unify the bar diameter (exclude nominal bar) inside one span, check the check box.

**Allowance of bar area** - Enter the allowance coefficient of main bars area and stirrup area, the effect of allowance factor is same as above describes in [slab page](#).

#### Max Space Perpendicular to Span:

**Max spacing of longitudinal bars** - Enter the maximum transverse spacing of longitudinal bars in direction that perpendicular to beam span according the requirement of CoP2013.

- Max spacing of stirrup legs** - Enter the maximum transverse spacing of stirrup legs in direction that perpendicular to beam span according the requirement of CoP2013.
- Lapping of bottom bars** - Click the radio button to select the lapping of bottom bar at the center of the support or at the edge of the support.
- d2 Calculation Options** - There are 3 options to calculate d2 value. (1) The d2 is calculated based on the preferred bar diameter and assume the number of bars at all layers are the same. (2) The d2 is calculated based on the largest actual bar diameter and assume the number of bars at all layers are the same. (3) The d2 is calculated based on the actual bar diameter and actual bar number at each layers.
- Deflection** - Select Depth Span Ratio to use Clause 7.3.4 for checking the deflection of beam and select By Curvature to use Clause 7.3.5 for checking the deflection of beam.
- Deflection Limit** - If you select "By Curvature" option, you need to define this deflection limit.
- Default Segment** - Enter the maximum beam span for each segment number, e.g. for 8 segments, the beam span not longer than 4.0 M.
- Bending direction of bars** - There are two options to control the direction of bending bar at column or wall support. (1) the bars are bending toward column or wall, i.e. top bars bend up and bottom bars bend down. (2) the bars are bending toward beam, i.e. top bars bend down and bottom bars bend up. Click the radio button to select the direction you want.
- Concrete Cover** - If you check the Multiple concrete cover check box, you can enter 3 different concrete covers in one beam section, bottom cover, top cover and side cover. If you prefer to have only one concrete cover in same beam section, you should not check the check box.
- Minimum Bar** - Enter minimum bar number, maximum bar number and minimum stirrup leg number for different beam width.
- Width** - Enter the width of the beam section(in M).
- Min. bar** - Enter the minimum number of longitudinal bars you desired for correspondence section.
- Max. bar** - Enter the maximum number of longitudinal bars you desired for correspondence section.
- Min. leg** - Enter the minimum number of stirrup legs you desired for correspondence section.

## 5.2.8 Column Page

When you click the Column page of Master Data sub-command, **SADS** will display the Column page as in the following figure.

The screenshot shows the 'Master Data' software interface with the 'Column' page selected. The interface includes the following sections and parameters:

- Moment Factors:** For vertical load (0.000), For lateral load (0.000).
- Moment Calculation:**  By single column,  By substitute frame.
- Bracing:**  By default,  Defined by input data.
- Options:** Tolerance of trial-error method (0.100 %), Minimum eccentricity (0.050 B or 20 mm), Allowance of bar area (1.080), Round up height of critical zone (10 mm).
- Main Bars:** Bar type:  High tensile,  Mild steel. Minimum diameter (25 mm), Minimum clear space (60 mm), Min. reinforcement ratio (1.00 %), Max. reinforcement ratio (8.00 %).
- Links:** Bar type:  High tensile,  Mild steel. Minimum diameter (0.25 Dm or 8 mm), Maximum spacing (12.0 Dm or 300 mm or 1.00 S), Increment of spacing (10 mm),  Reduce links.
- Circular Column Checking:**  Check beam-column joint, Equivalent square column size (0.866 Diam).
- Axial Load Options:**  Check short column,  Same axial load.
- Note:** Dm is diameter of main bar, S is smaller size of column section, B is section size along eccentricity.
- Serviceability:**  Crack Control, Factor (0.000), Max.Width (0.3).
- Effective Height:**  By Formula,  By Table.

At the bottom of the window, there is a 'Close' button and a status bar showing 'TESTDATA CP2013'.

**Moment Factors:**

**For vertical load** - Enter the value of the bending moment factor of vertical load. **SADS** defined the range of support factor is 0.0 to 1.0, depend on the point of bending moment you selected. "0.0" indicates the point is at the center of the beam, "1.0" indicates the point is at the edge of the beam.

**For lateral load** - Enter the value of the bending moment factor of lateral load. Same as above, **SADS** defined the range of support factor is 0.0 to 1.0.

**Moment calculation** - **SADS** provided two difference kinds for the calculation of column.

- according to single column for the calculation,
- according to the substitute frame to calculate.

Click the radio button to select the moment calculation you want. There are a limitations in substitute frame.

1. The maximum beams number connected to the column is 4.
2. The maximum substitute frame number connected to the column is 2.
3. The directions of substitute frames is either in X-X direction or Y-Y direction.

**Bracing** - There are 2 choices how to define braced column:

- By default - **SADS** defines the braced column if the column does not take any lateral load;
- Defined by input data - **SADS** defines a column is braced according to data that input by users.

Click the radio button to select a choice that you want.

**Main Mars:**

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the main bars.

**Minimum diameter** - Click the combo box to select the minimum diameter (in mm.) of main bars of the columns.

**Minimum clear space** - Enter the value (in mm.) of the clear space between main bars.

**Min. reinforcement ratio** - Enter the minimum percentage (in %) about the area of main bars / the gross cross-sectional area of the concrete.

**Max. reinforcement ratio** - Enter the maximum percentage (in %) about the area of main bars / the gross cross-sectional area of the concrete.

**Links:**

**Bar type** - Click the radio button to select the high tensile or mild steel of links you want.

**Minimum diameter** - Enter the minimum diameter of link to times of main bar's diameter (Dm) or Click the Combo box to select the absolute value in mm.

**Maximum spacing** - Enter the maximum pitch of links. Either to times of main bar's diameter (Dm), the absolute value in mm or times of least lateral dimension (S).

**Increment of link spacing** - Enter the increment value (in mm.) of the space between links.

**Reduce Links** - If you check this check box, **SADS** will follow the Clause 9.5.2.2 in CoP2013 to reduce the amount of links.

**Options:**

**Tolerance of trial-error method** - Enter the tolerance value (in %) of trial-error method. The smaller the value the accuracy the result, and the longer the calculation time. **SADS** suggests the value is 0.1%. If it cannot converging in some cases, you may increasing this value.

**Minimum eccentricity** - Enter the minimum eccentricity for section design. Enter the times of section size (B) or the absolute value in mm.

**Allowance of bar area** - Enter the allowance coefficient of main bars area, the effect of the allowance factor is same as above describes in [slab page](#).

**Circular Column Checking:**

**Check beam-column joint** - If you check this check box, **SADS** will check the beam-column joint on circular column by using equivalent square section. Otherwise, these checking will be skipped.

**Equivalent square column size** - Enter a factor of the size, the default value is 0.866.

**Axial Load Options:**

**Check short Column** - If you check this check box, **SADS** will perform additional checking according with Clause 6.2.1.4(c) in CoP2013. You may un-check this check box to skip the checking.

**Same axial load** - If you check this check box, the axial loads for checking top section and bottom section are the same. If the check box is un-checked, the axial load for top section will not include the self weight of column in current floor.

**Serviceability:**

**Crack Control** - Check the check box to perform the calculation of crack width of tension or light loaded columns.

**Factor** - Enter the value of  $P/f_{cu}/A_c$ . If you enter 0.00 to the edit box, **SADS** will perform crack control for tension columns only. If you enter a non-zero value, e.g. 0.2, all columns with  $P/f_{cu}/A_c < 0.2$  will be checked the crack width.

**Max. Width** - Enter the maximum width of cracking (in mm).

**Effective Height** - There are 2 methods for calculating effective height of column, by formulas and by tables. You may click the radio button to select the method that good for you.

## 5.2.9 Wall Page

When you click the Wall page of Master Data sub-command, **SADS** will display the Wall page as below.

The screenshot shows the 'Master Data' software window with the 'Wall' tab selected. The interface is organized into several panels:

- Vertical Bars:** Radio buttons for 'High tensile steel' (selected) and 'Mild steel'. Input fields for Preferred diameter (25 mm), Minimum diameter (16 mm), Minimum spacing (80 mm), Maximum spacing (300 mm), Min. reinforcement ratio (0.40 %), and Max. reinforcement ratio (8.00 %).
- Horizontal Bars:** Radio buttons for 'High tensile steel' (selected) and 'Mild steel'. Input fields for Minimum diameter (0.3 Dm or 10 mm), Maximum Spacing (300 mm), Minimum Spacing (80 mm), and Min reinforcement ratio (0.25 %).
- Links:** Radio buttons for 'High tensile steel' (selected) and 'Mild steel'. Input fields for Minimum diameter (0.3 Dm or 8 mm), Maximum spacing (16.0 Dm or 300 mm).
- Serviceability:** Checked 'Cracking Control' with Factor (0.000) and Max. Crack Width (0.3).
- Options:** Increment of spacing (10), Tolerance of trial-error method (1.000 %), Allowance of bar area (1.080).
- Stocky Wall:** Checked 'Check axial load'.
- Note:** Dm is diameter of vertical bars.

### Vertical Bars:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the vertical bars.

**Preferred diameter** - Click the combo box to select the preferred diameter of vertical bar you want (in mm). **SADS** will adopt it as far as possible.

**Minimum diameter** - Click the Combo box and select the minimum diameter (in mm) of the vertical bar you want.

**Maximum spacing** - Enter the maximum pitch of vertical bars (in mm).

**Minimum spacing** - Enter the minimum pitch of vertical bars (in mm).

**Min. reinforcement ratio** - Enter the minimum percentage (in %) about the area of vertical bar / the gross cross-sectional area of the concrete.

**Max. reinforcement ratio** - Enter the maximum percentage (in %) about the area of vertical bar / the gross cross-sectional area of the concrete.

### Horizontal Bars:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the horizontal bars.

**Minimum diameter** - Click the combo box to select the minimum diameter of horizontal bar. Either to times of vertical bar's diameter (Dm) or the absolute value in mm.

**Maximum spacing** - Enter the maximum pitch of horizontal bars (in mm).

**Minimum spacing** - Enter the minimum pitch of horizontal bars (in mm).

**Min. reinforcement ratio** - Enter the minimum percentage (in %) about the area of horizontal

bars / the gross cross-sectional area of the concrete.

**Links:**

**Bar type** - Click the radio button to select high tensile steel or mild steel of the link bar.

**Minimum diameter of link** - Enter the minimum diameter of link to times of main bar's diameter ( $D_m$ ) or Click the Combo box to enter the absolute value in mm.

**Maximum spacing of links** - Enter the maximum pitch of links. Either to times of vertical bar's diameter ( $D_m$ ) or the absolute value in mm.

**Options**

**Increment of spacing** - Enter the increment value (in mm.) of the space between the bars.

**Tolerance of trial-error method** - Enter the tolerance value (in %) of trial-error method in this field. The smaller the value the accuracy the result, and the longer the calculation time. **SADS** suggests the value is 1.0%. If it cannot converging in some cases, you may increasing this value.

**Allowance of bar area** - Enter the allowance coefficient of vertical bars area, the effect of the allowance factor is same as above describes in [slab page](#).

**Shear Lag** - **SADS** provides 3 options for calculate shear lag.

**Always consider** - If the shear lag flag in wall section element is "X" or "Y", **SADS** always consider those elements as shear lags.

**Depend on direction** - For X-X direction, only the elements of shear lag flag "X" are consider as shear lags. For Y-Y direction, only "Y" is considered.

**Never consider** - The shear lag is never considered.

**Serviceability:**

**Crack Control** - Check the check box to perform the calculation of crack width of tension or light loaded walls. **SADS** will perform the checking for single element wall only.

**Factor - Factor** - Enter the value of  $P/f_{cu}/A_c$ . If you enter 0.00 to the edit box, **SADS** will perform crack control for tension single element walls only. If you enter a non-zero value, e.g. 0.2, all single element walls with  $P/f_{cu}/A_c < 0.2$  will be checked the crack width.

**Max. Width** - Enter the maximum width of cracking (in mm).

**Stocky Wall** - If you check this check box, **SADS** will perform additional checking according with Clause 6.2.2.2(f) in CoP2013. You may un-check this check box to skip the checking.

**Elastic Checking** - In wall design program, there are elastic checking by MC/I method. If the checking can be met the requirement of load capacities of wall, the bi-axial checking will be skipped. If you prefer to use the bi-axial method in any cases, you can un-check this check box.

## 5.2.10 Lintel Page

When you click the Lintel page of Master Data sub-command, **SADS** will display the Lintel page as in the following figure.

### Main Bars:

**Bar type** - Click the radio button to select the high tensile steel or mild steel for the main bar of lintel beam.

**Preferred diameter** - Click the combo box and select the preferred diameter of main bar (in mm) you wish to use in calculation, this value is used to estimate the effective depth of lintel beams. **SADS** will according to the actual requirement of calculation to determine the diameter of main bar.

**Minimum diameter** - Click the combo box to select the minimum diameter of main bar you wish (in mm).

**Min. horizontal clear space** - Enter the minimum horizontal clear space of main bars.

**Min. vertical clear space** - Enter the minimum vertical clear space of main bars.

**Min. reinforcement ratio** - Enter the minimum percentage (in %) about the area of tensile bars / the gross cross-sectional area of the concrete.

**Max. reinforcement ratio** - Enter the maximum percentage (in %) about the area of compressive bars / the gross cross-sectional area of the concrete.

### Stirrups:

**Bar type** - Click the radio button for choosing high tensile steel or mild steel of the stirrups.

**Diameter** - Click the combo box and select the value (in mm) of the minimum and maximum diameter of the stirrups you want.

**Maximum spacing** - Enter the maximum pitch of stirrups. Either to times of lintel beam effective depth ( $d_1$ ) or the absolute value in mm.

**Minimum spacing** - Enter the minimum pitch of stirrups. Either to times of stirrup diameter ( $D_m$ ) or the absolute value in mm.

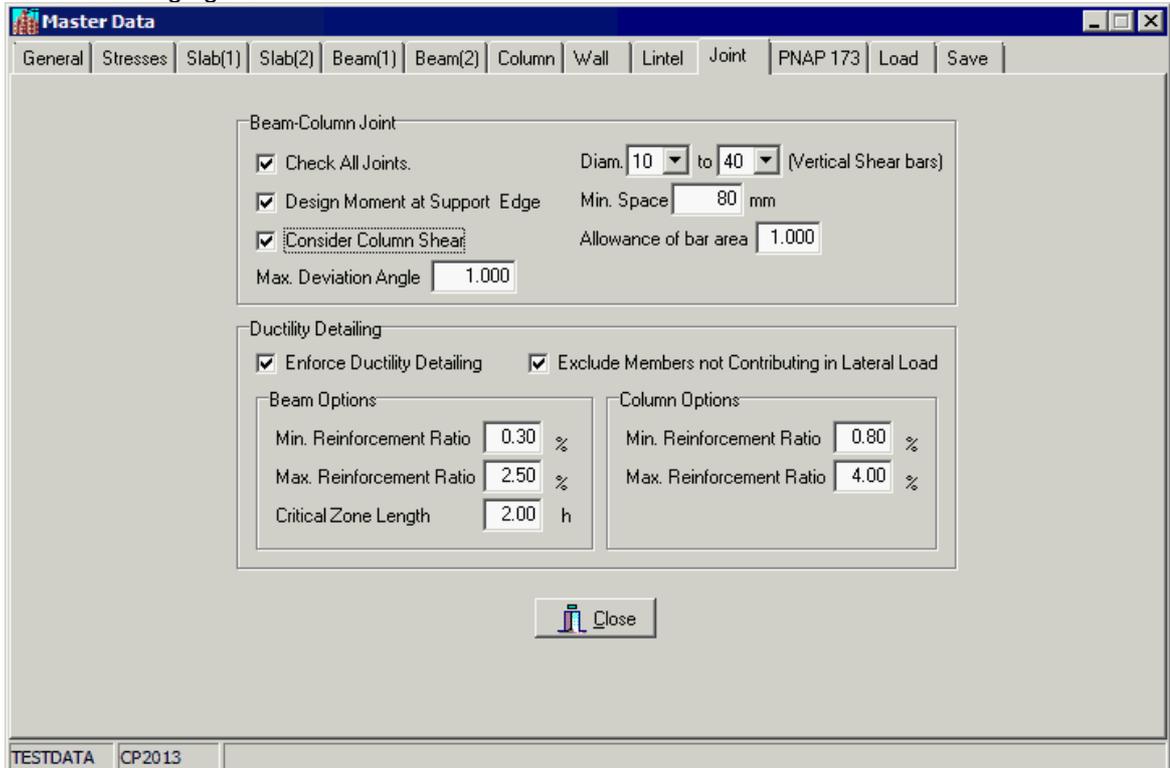
**Min. reinforcement ratio** - Enter the minimum percentage (in %) about the area of stirrups / the horizontal area of the concrete at that section.

**Increment of stirrup spacing** - Enter the increment value (in mm.) of the space between the stirrups.

**Allowance of bar area** - Enter the allowance coefficient of main bars area and stirrup area, the effect of allowance factor is same as above describes in [slab page](#).

### 5.2.11 Joint Page

When you click the Joint page of Master Data sub-command, **SADS** will display the Joint page as in the following figure.



#### Beam-column Joint:

**Check All Joints** : If you don't check this check box, **SADS** will check the joint when the section of column is changed, the concrete grade of column is changed or the bending moments of beams are different. This option will ignore the variance of axial force of column. If you check this check box, **SADS** will check all beam-column joints in selected job list to consider the effect of axial load accurately.

**Design Moment at Support Edge** : If the check box is not checked, the design moment of joint is taken at the support moment of beam design. If it is checked, the design moment of joint is taken at the edge of support.

**Consider Column Shear**: If you want to take account the shear in upper column of joint, you may check this check box.

**Max. Deviation Angle** : According with the requirement of [beam-column joint](#), the connected beams must either parallel to X axis or Y axis. This option gives you a flexibility. You may enter a small value of angle in the edit box. **SADS** will consider the connected beams that not totally parallel to X axis or Y axis, i.e. the connected beams may have a deviation angle that not greater than the Max Deviation Angle.

**Diam.** : You may specify the smallest and the largest diameter of bar for providing reinforced bars to beam-column joint.

**Min.Space** : You may specify the minimum space of link in beam-column joint.

**Allowance of bar area** - Enter the allowance coefficient of bars area, the effect of allowance factor is same as above describes in [slab page](#).

#### Ductility Detailing:

**Enforce Ductility Detailing**: The default value is true. You may un-check this check box if you don't want to apply the requirement in Clause 9.9 in CoP2013 for studying purpose, comparing purpose, or other purpose.

**Exclude Members not Contributing in Lateral Load**: If you check this check box, all beams and columns that do not carrying lateral load will not be checked the ductility detailing.

#### Beam Options:

**Min. Reinforcement Ratio**: Enter the minimum percentage (in %) longitudinal reinforced bars of beam.

**Max. Reinforcement Ratio**: Enter the maximum percentage (in %) longitudinal reinforced

bars of beam.

**Critical Zone Length:** Enter the length of critical zone measured from the edge of support. The default value is 2.0.

**Column Options:**

**Min. Reinforcement Ratio:** Enter the minimum percentage (in %) longitudinal reinforced bars of column.

**Max. Reinforcement Ratio:** Enter the maximum percentage (in %) longitudinal reinforced bars of column.

## 5.2.12 PNAP 173 Page

When you check the PNAP 173 box of General page and continuing to click PNAP 173 page of Master Data sub-command, **SADS** will display the PNAP 173 page of CP1987 as in the following figure.

The screenshot shows the 'Master Data' window with the 'PNAP 173' tab selected. The interface is divided into several sections:

- Cantilevered Slab:**
  - Minimum thickness:
    - For  $L < 0.5M$ : 110 mm
    - For  $0.5M \leq L < 0.75M$ : 125 mm
    - For  $L \geq 0.75M$ : 150 mm
  - Minimum bar diameter: 10
  - Maximum bar spacing: 150 mm
  - Min. reinforcement ratio: 0.25 %
  - Minimum anchorage length: 45 d
- Cantilevered Slab and Beam:**
  - Maximum span depth ratio: 7
- Exposed to Weathering:**
  - Control Limit:
    - By Crack
    - By Stress
  - Maximum crack width: 0.1 mm
  - Maximum tensile stress: 100.0 N/mm<sup>2</sup>
  - Minimum concrete cover: 40 mm
- Beam:**
  - Minimum concrete cover: 40 mm

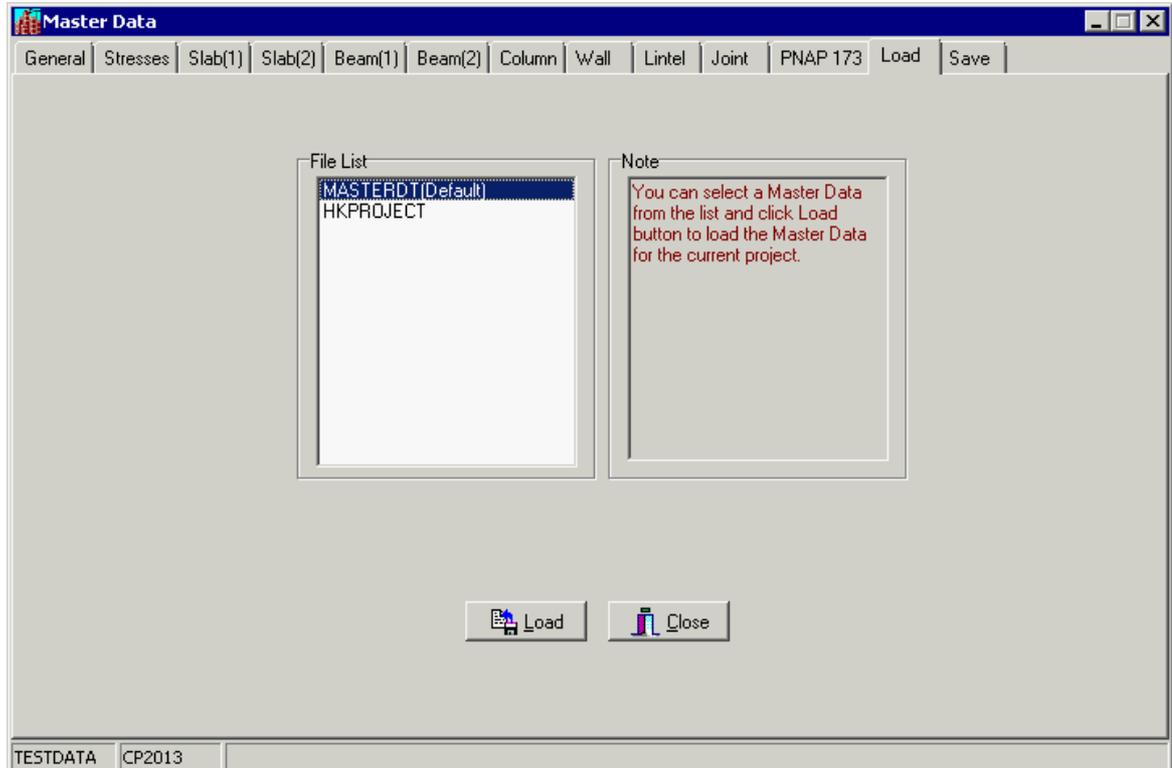
A warning box on the right side of the window contains the following text: "The data displayed on the page are taken from Appendix A of Practice Notes for Authorized Persons and Registered Structural Engineers 173 (PNAP173). You should not change these data except you got updated data from B.D."

The above data are collected from the PNAP 173 of Hong Kong B.D., usually they should not be changed, unless you are sure that B.D. made amendment about some of them, then you can enter the new data on the appropriate field.

In Exposed to Weather group, there are 2 options for controlling the limit of slab, by crack and by stress. By crack option is recommended. This option is more consistent with limit state method. If you select by stress option in your project, you should make sure that your submission can be accepted by BD.

### 5.2.13 Load Page

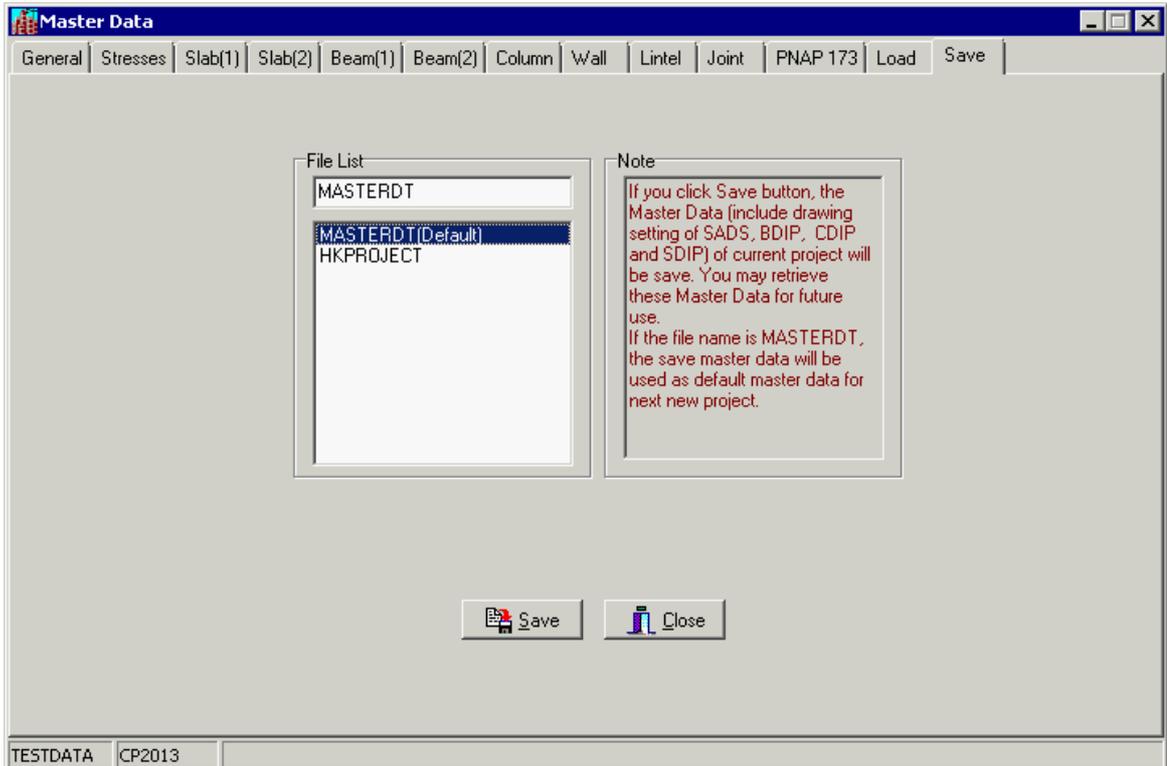
When you click the Load page of Master Data sub-command, **SADS** will display the Load page as below.



This page is use to load the master data (include drawing setup data for **SADS**, **BDIP**, **CDIP** and **SDIP**) that you had save in the previous project for your current project. The left hand side are the lists of master data file which had been saved, you may highlight the desired file name that you want to load and click the load button. The file MASTERDT is the default master data. When you create a new project, SADS always load the default file to the new project data folder.

### 5.2.14 Save Page

When you click the Save page of Master Data sub-command, **SADS** will display the Save page as below.



This page is use to save the master data of your current project. You should give it a file name by typing on the top of the left hand side edit box and click the save button. **SADS** will than save it into [Project List Folder](#). If you assign MASTERDT to the save file, this file becomes a default master data that will be copied to new project automatically.

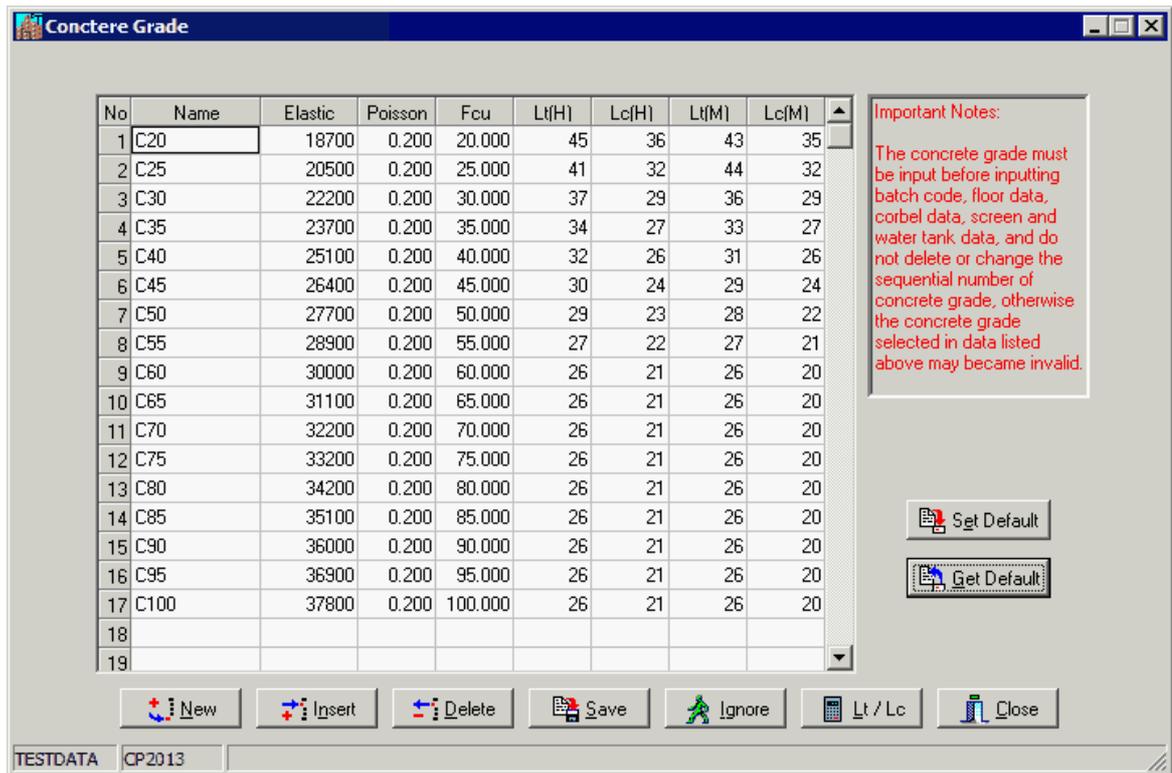
On the lower part of the left hand side are the lists of previous master data file name that you had save before.

## 5.3 Concrete Grade Sub-command

In this sub-command, **SADS** enables you to define the maximum permissible stresses and elastic modules of various concrete grade for the usage of calculation.

When you choose Concrete Grade from System Command or click  button on [Command](#)

[Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display Concrete Grade window as below.



**Name** - Enter the description of concrete grade.

**Elastic** - Enter the elastic modulus of concrete (in  $N/mm^2$ ).

**Poisson** - Enter the Poisson's ratio.

**Fcu** - Enter the characteristic strength of concrete (in  $N/mm^2$ ).

**Lt(H)** - Enter the bond length of tension bars for high tensile steel (times of bar diameter).

**Lc(H)** - Enter the bond length of compressive bars for high tensile steel (times of bar diameter).

**Lt(M)** - Enter the bond length of tension bars for mild steel (times of bar diameter).

**Lc(M)** - Enter the bond length of compressive bars for mild steel (times of bar diameter).



- Click this button to calculate the all bond lengths in the concrete grid according with clause 8.4.5 in CP-2004.



- Click the button to save the concrete mix table of the project as the default concrete mix table for next new project.



- Click the button to load the default concrete mix table for the project. When a new project is created, the default concrete mix table is loaded automatically.

After supply the information, You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 5.4 Batch Code Sub-command

In the Batch Code sub-command, **SADS** will prompt you to supply the batch code, concrete grade of slab & beam and floor level of the building.

When you choose Batch Code from System Command or click  button on [Command Button](#)

[Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Batch Code window as below.

No.	Batch Code	Concrete Grade	Floor Level	FLS Temperature	Auto
1	UR	C35	55.900	525.0	<input checked="" type="checkbox"/>
2	RF	C35	52.700	525.0	<input checked="" type="checkbox"/>
3	13	C35	49.500	525.0	<input checked="" type="checkbox"/>
4	TF	C35	46.300	525.0	<input checked="" type="checkbox"/>
5	2F	C40	14.300	525.0	<input checked="" type="checkbox"/>
6	1A	C40	8.800	525.0	<input checked="" type="checkbox"/>
7	1F	C40	10.300	525.0	<input checked="" type="checkbox"/>
8	GR	C40	5.300	525.0	<input checked="" type="checkbox"/>
9	BS	C40	1.800	525.0	<input checked="" type="checkbox"/>
10					
11					
12					
13					
14					
15					
16					
17					
18					

**Important Note:**  
The batch code must be input before inputting slab and beam data and do not change or delete the batch code after the slab or beam data have been input, otherwise these data can not be retrieved from

Buttons: Add, Insert, Delete, Save, Ignore, Close

TESTDATA CP2013

**Batch Code** - Enter the name of batch that consists of same framing plan and same concrete grade, named up to four alphanumerical characters.

**Concrete Grade** - Click the combo box of the concrete grade, and select the grade of concrete of slabs and beams you want to use.

**Floor Level** - Enter the top floor level of the correspondence batch code. You may get the value (in M) from structural framing plane.

**FLS Temperature** - Enter the design temperatures for FLS.

**Auto** - If the batch code is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input batch code manually, you don't check this check box.

After supply the information, You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 5.5 Floor Data Sub-command

In the Floor Data sub-command, **SADS** will prompt you to supply the floor code, floor name, floor level, column cover, wall cover and the concrete grade of column & wall.

When you choose Floor Data from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Floor Data as below.

**Floor Information**

Floor Data

No	Fl.Code	Floor Name	Alternative	Level	Cl.Cover	Wl.Cover	Cl.Concrete	Wl.Concrete	Temper.	Batch C.
1	UR/F	UPPER ROOF	<input type="checkbox"/>	55.900	25	25	C40	C40	580.0	UR
2	RF/F	ROOF FLOOR	<input type="checkbox"/>	52.700	25	25	C40	C40	580.0	RF
3	13/F	13TH. FLOOR	<input type="checkbox"/>	49.500	25	25	C40	C40	580.0	13
4	12/F	12TH. FLOOR	<input type="checkbox"/>	46.300	25	25	C40	C40	580.0	TF
5	11/F	11TH. FLOOR	<input type="checkbox"/>	43.100	25	25	C40	C40	580.0	TF
6	10/F	10TH. FLOOR	<input type="checkbox"/>	39.900	25	25	C40	C40	580.0	TF
7	09/F	9TH. FLOOR	<input type="checkbox"/>	36.700	25	25	C40	C40	580.0	TF
8	08/F	8TH. FLOOR	<input type="checkbox"/>	33.500	25	25	C40	C40	580.0	TF
9	07/F	7TH. FLOOR	<input type="checkbox"/>	30.300	25	25	C40	C40	580.0	TF
10	06/F	6TH. FLOOR	<input type="checkbox"/>	27.100	25	25	C40	C40	580.0	TF
11	05/F	5TH. FLOOR	<input type="checkbox"/>	23.900	25	25	C45	C45	580.0	TF
12	04/F	4TH. FLOOR	<input type="checkbox"/>	20.700	25	25	C45	C45	580.0	TF
13	03/F	3RD. FLOOR	<input type="checkbox"/>	17.500	25	25	C45	C45	580.0	TF
14	02/F	2ND. FLOOR	<input type="checkbox"/>	14.300	25	25	C50	C50	580.0	2F
15	01/F	1ST. FLOOR	<input type="checkbox"/>	10.300	25	25	C50	C50	580.0	1F

Lowest Dimension  
Options:  
 Length 1.500  
 Level

Global Change  
Old Code  New Code

**Important Note:**  
If beam, column, wall and lintel data have been input, the floor code in the grid can not be changed directly on the grid, otherwise some data can not be retrieved from database. Please use global change to change this floor code.

TESTDATA CP2013

**Floor Code** - Enter the name of the floor code of each floor in the building, it must be 4 characters long. The floor codes start from the top story progressing towards the bottom story of the building.

**Floor Name** - Enter the description of corresponding floor code, it up to 12 characters long.

**Alternative** - Check this check box if the floor is alternative floor. The alternative floor is a special floor that has no corresponding level in ETABS.

**Floor Level** - Enter the top level of each floor. You may get the value (in M) from structural framing plane.

**Column Cover** - Enter the concrete cover of the columns (in mm).

**Wall Cover** - Enter the concrete cover of the walls (in mm).

**Cl. Concrete** - Click the combo box of the concrete grade, and select the grade of concrete of columns you want to use.

**Wl. Concrete** - Click the combo box of the concrete grade, and select the grade of concrete of walls and lintel beams you want to use

**Temper.** - Enter the design temperature for FLS of this floor.

**Batch C.** - Click the combo box to select the [batch code](#) of this floor.

**Lowest Dimension** - You can provide the default length of the lowest columns or the level of the cap of foundation. These default values will be used for inputting column and wall data.

If you have input beam data, column data, wall data, lintel data, etc., you should not change the floor code inside grid control directly. If you do so, you may lose these input data. You must use the global change function to change the floor code.

- Select the floor code that you want to change from Old Code combo box;
- Enter the new floor code to New Code edit box;
- Click the  button to change the floor code across **SADS** database.

After supplied all the information of this sub-command, You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 5.6 Drawing Setup Sub-command

The Drawing Setup sub-command is used to customize the layout of loading plan drawing of column and wall.

When you choose Drawing Setup from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Drawing Setup as below.

**AutoCAD Version** - Select the AutoCAD version that you are using. If you are using AutoCAD 2014 or 2015, you should add SADS.LSP in program folder to AutoCAD Trusted Location to meet the security requirement of AutoCAD.

**Sizes** - Enter the values (in mm) of the drawing paper width and height, and the logo width and height that appear at the right hand bottom of the paper.

**Row Height** - Enter the values (in mm) of the row height for the title, the label and the loading.

**Column Width** - Enter the values (in mm) of the column width for the column drawing and the wall drawing. The columns of column drawing are column mark, column section, axial load of column, horizontal load of column and the information of foundation cap. The columns of wall drawing are wall mark, axial load of wall, center diameter of wall, vertical moment of wall, horizontal load of wall and the information of foundation cap.

**Rounding** - Enter the numbers of the places of decimals for the column drawing and the wall drawing. The subject of rounding at column drawing are axial load and horizontal load, while the subject of rounding at wall drawing are axial load, center diameter, vertical moment and horizontal load.

**Wall Display Option** - Click the radio button to select wall display option by section center (C.G.) or by load center.

**Text Height** - Enter the values (in mm) of the height of difference texts, such as title text, label text, unit text and loading text.

**Layer Name** - Enter the layer name of AutoCAD for difference purposes, such as grid line, title text, label text, unit text and loading text.

**Line Weight** - Enter the line weight for each layer name.

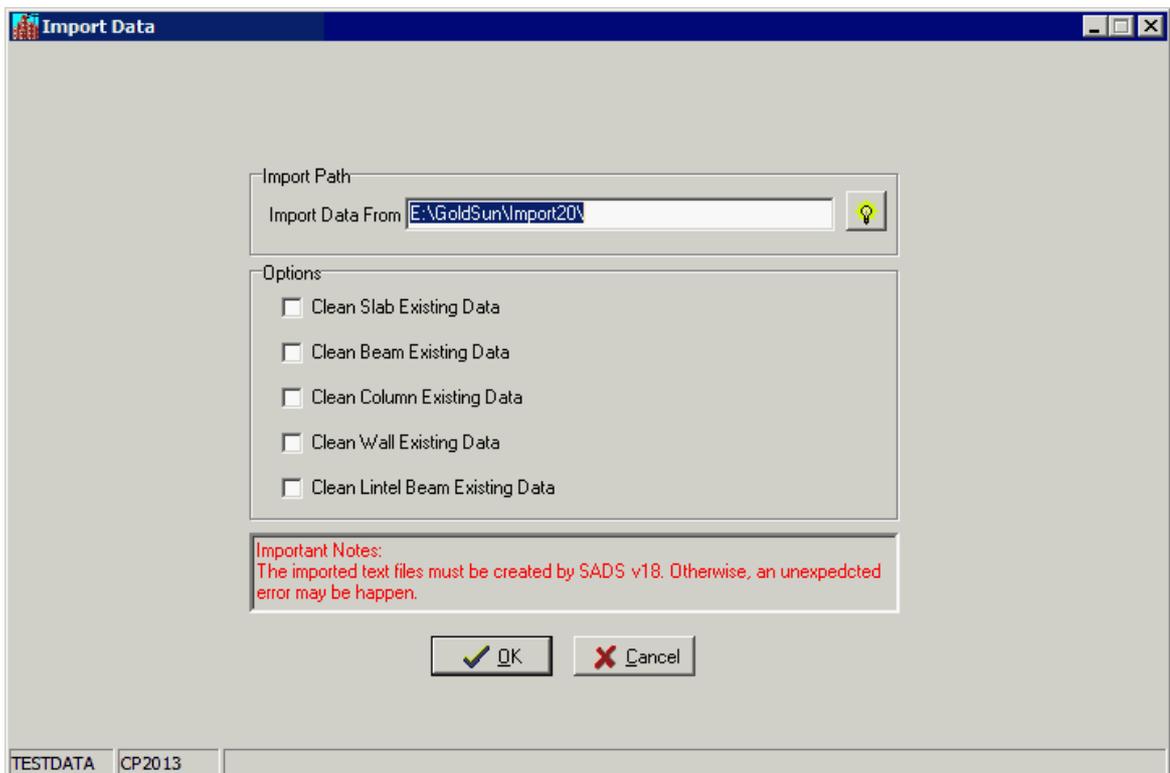
**Line Color** - Select the line color for each layer name.

After finish the data input of this sub-command, click Ok button to save it or click Cancel button to deny it.

## 5.7 Import Data Sub-command

The Import Data sub-command is use to transfer the text files to the database of **SADS**. The imported text files must be exported from other computer that run the same version of **SADS**, i.e. **SADS** v20. If the imported text files are exported from different version of **SADS**, un-expected errors will be happen.

When you choose Import Data from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Import Data as below.



### Import Path Group Box:

**Import Data From** - Enter the name of the folder where the previous text file was.

**Brows button** - Click the brows button, window can help you to find out the name of text file folder.

### Options Group Box:

**Clean Slab Existing Data** - If you are import all sets of slab data, you may check the check box to clean the existing slab data in database.

**Clean Beam Existing Data** - If you are import all sets of beam data, you may check the check box to clean the existing beam data in database.

**Clean Column Existing Data** - If you are import all sets of column data, you may check the check box to clean the existing column data in database.

**Clean Wall Existing Data** - If you are import all sets of wall data, you may check the check box to clean the existing wall data in database.

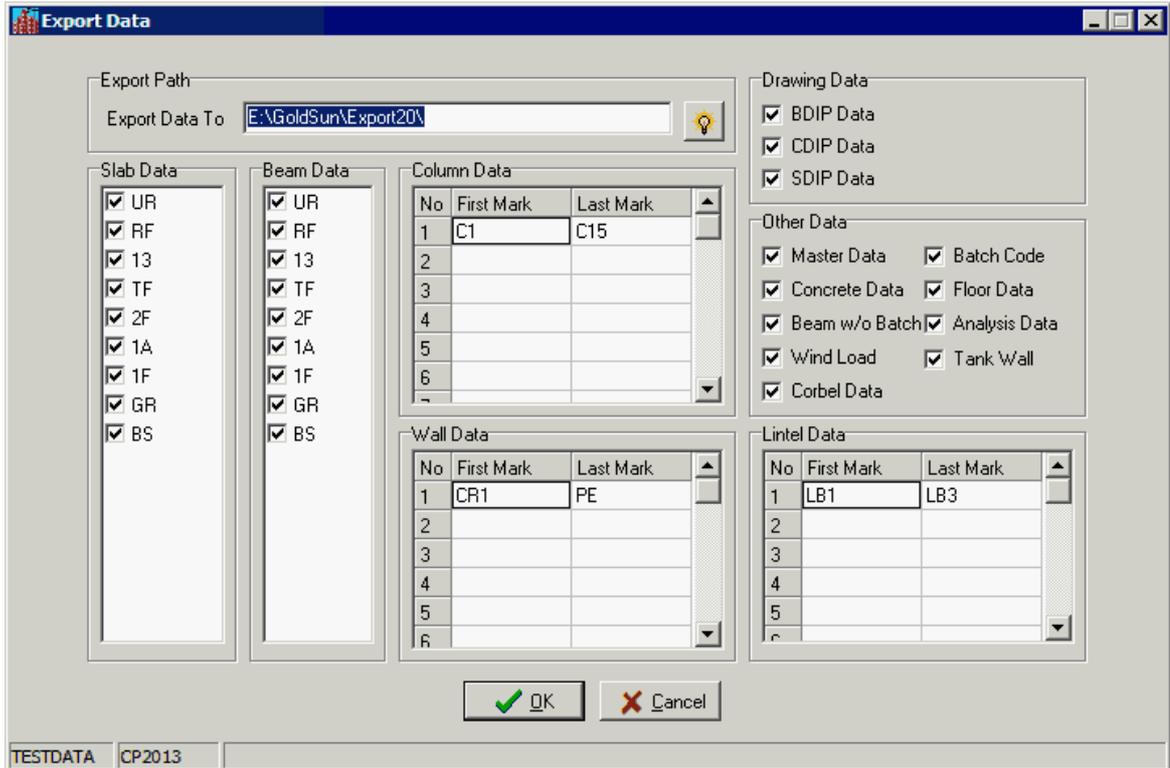
**Clean Lintel Existing Data** - If you are import all sets of lintel data, you may check the check box to clean the existing lintel data in database.

To execute this sub-command, click Ok button. To deny it, click Cancel button.

## 5.8 Export Data Sub-command

The Export Data sub-command can partially or wholly convert project data from the database of **SADS** to the text files. These text files can be imported to other computer that the same version of **SADS** be installed.

When you choose Export Data from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Export Data as below.



**Export Data To** - Enter the name of the folder for exporting data.

**Brows button** - Click the brows button, window can help you to find out the name of folder.

**Slab Data** - Check the check box that you want to export a whole batch of slab data.

**Beam Data** - Check the check box that you want to export a whole batch of beam data.

**Column Data** - Enter the first marks and last marks of columns that you want to export.

**Wall Data** - Enter the first marks and last marks of walls that you want to export.

**Lintel Data** - Enter the first marks and last marks of lintel beams that you want to export.

**Drawing Data** - Check the check boxes that you want to export those data.

**Other Data** - Check the check boxes that you want to export those data.

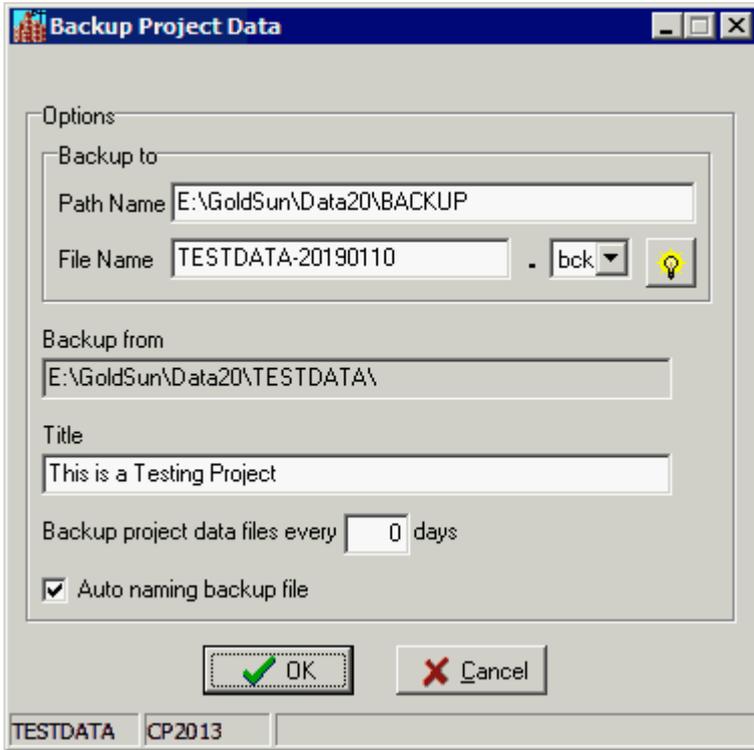
To execute this sub-command, click Ok button. To deny it, click Cancel button.

## 5.9 Backup Data Sub-command

The best way to prevent losing data is to backup the project data periodically. The Backup Data Sub-command can help you to create backup file for the current project easily. You may restore the backup file to project folder using [restore data sub-command](#) when your project data are corrupted.

When you choose Backup Data from System Command or click  button on [Command Button Bar](#)

Bar then click  button on [Sub-command Button Bar](#), **SADS** will display the Backup Data as below.



**Backup to** - Enter the path name, file name and select extension name of backup file, or click the  button to browse the existing folders and the name of backup file.

**Backup from** - This is a read only edit box. The information is the current project data folder.

**Title** - Enter a description about the backup file. The description will be displayed when you select a backup file to be restored. The default title name is the name of current project.

**Backup project data files every xx days** - If the value of xx is greater than zero, **SADS** will check the last backup date every time you exit **SADS**, and prompt you to backup your project data files when the date you specified is reach.

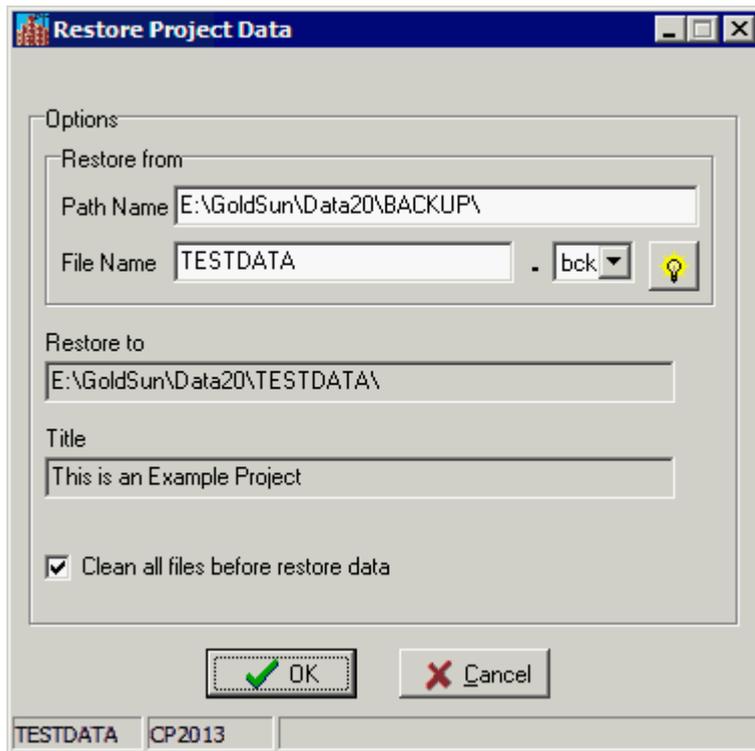
**Auto naming backup file:** If you check this check box, **SADS** will automatically provide the name of backup file as <Project Code>-<YYYYMMDD>. For example, the current project code is TESTDATA and today date is January 5, 2012, the provided backup file name is TESTDATA-20120105.

After finish the data input of this sub-command, click **OK** button to create backup file or **Cancel** to deny the process.

## 5.10 Restore Data Sub-command

When you find that your project data are corrupted, you may use the sub-command to restore project data from backup file that created by [backup data sub-command](#).

When you choose Restore Data from System Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Restore Data as below.



**Restore from** - Enter the path name, file name and select the extension name of backup file,

or click the  button to select the existing folders and name of backup file.

**Restore to** - This is a read only edit box. The value is the original project data folder.

**Title** - This is a read only edit box. It displays the description of the backup file when you create it. You should read the description carefully and make sure you are selecting a correct backup file for the project.

**Clean all files before restore data** - You may check this check box to get a clean restore.

After finish the data input of this sub-command, click **OK** button to restore the backup file or **Cancel** to deny the process.

## 6 Slab Command

### 6.1 About Slab Command

In the Slab Command, you can create, inquire slab data, and calculate, design slab reinforcement of the building.

When you choose Slab from the Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the slab sub-command buttons are display as below.



The Sub-commands are:

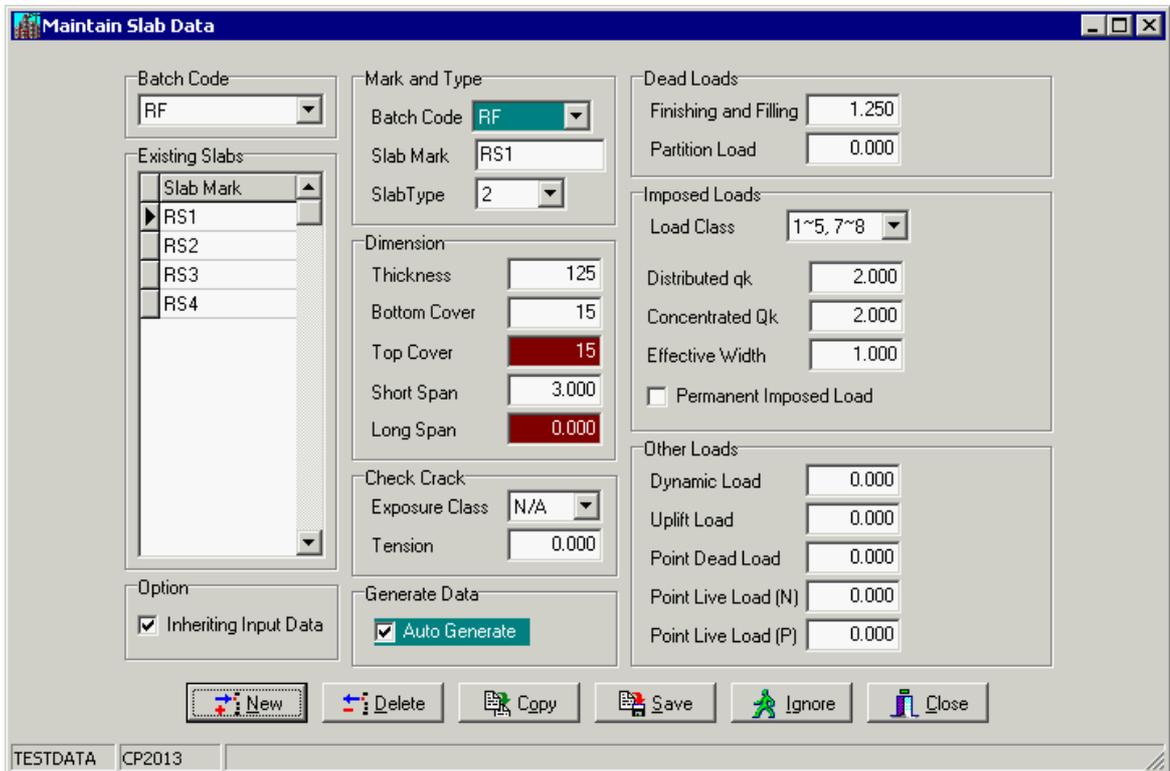
1. Maintain Slab Data Sub-command.
2. Slab Global change Sub-command.
3. Print Slab Reports Sub-command.
4. Validate Slab Data Sub-command.
5. Design Slab Sub-command.
6. Edit Slab Sketch Sub-command.

## 6.2 Maintain Slab Data Sub-command

The Maintain Slab Data sub-command is use to create a new slab data and edit an existing slab data.

When you choose Slab Data from Slab Command or click  button on [Command Button Bar](#)

then click  button on [Sub-command Button Bar](#), SADS will display the Maintain Slab Data as below.



**Batch Code** - Click the combo box, the listing of the individual batch codes of the slabs are previously define in the [Batch Code sub-command](#). The word "ALL" indicate all batch code that you previously define. You may search the desired batch code using [incremental search](#) in How to use SADS topic.

**Existing Slabs** - Indicate all the labs marks of the above batch code that you previously created. If you want to search the desired slab mark, you may use [incremental search](#) in How to use SADS topic.

**Mark and Type Group Box :**

**Batch Code** - This box is available at the above batch code is in "All" position only. Click the combo box to select the batch code of new slab.

**Slab Mark** - Enter the new slab mark. It must has the following formats:

[ppp]S[c]nnnn[a] or [C][ppp]Snnnn[a]

S -- slab mark must contain one upper case character S.

nnnn -- follow character S up to 4 digit numerical character can be appended.

[c] -- one lower case character c can be inserted between S and nnnn to represent cantilever slab.

[C] -- one upper case character C can be added to the first position of mark to represent cantilever slab.

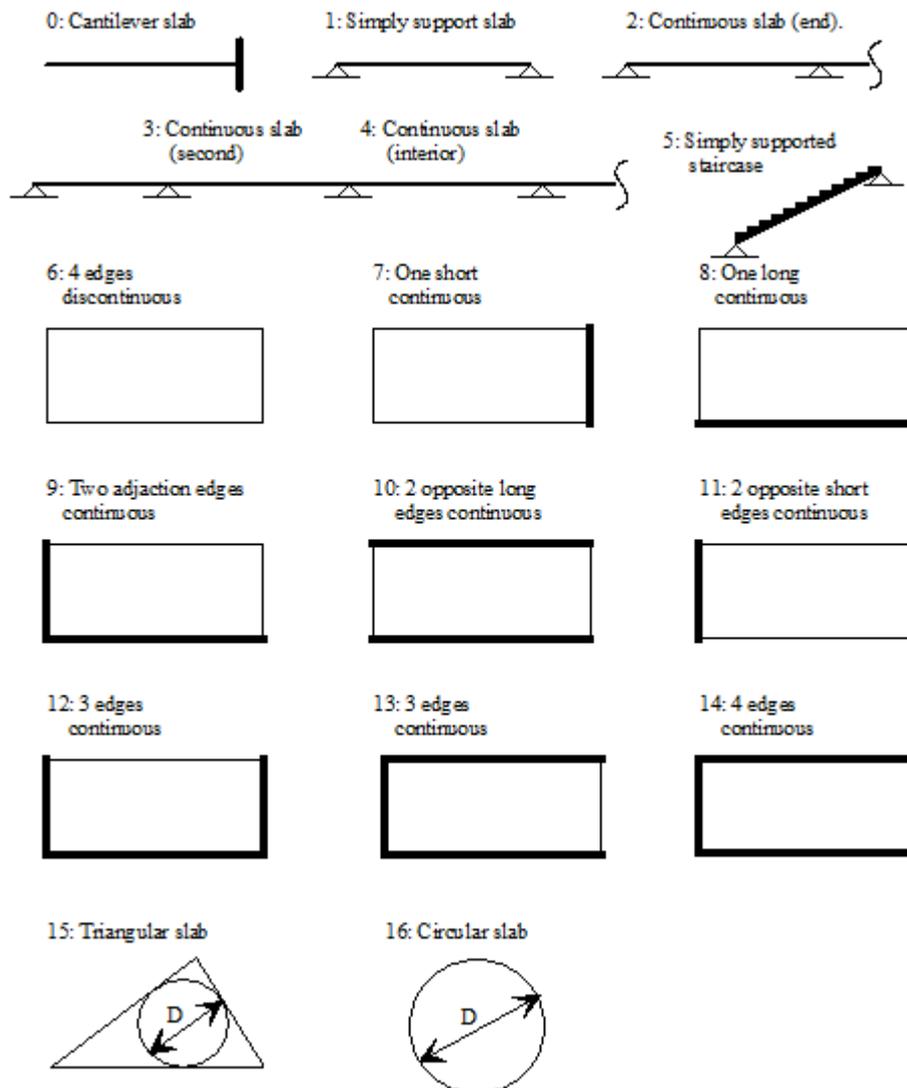
[ppp] -- up to 3 alphabetical or numerical characters can be added before S as a prefix.

[a] -- one alphabetical character can be appended at the last of the mark.

Note: all characters inside bracket are used optionally.

Examples: S12a, RS106, GSc23, C1S3B are valid marks, TS-12, CRSc12, CFD23, TKSC are invalid marks.

**Type** - Click the combo box to select the type of slab. **SADS** defines the type in 17 kinds shown in follow figure.



**Dimension Group Box** : As we previously mention in [About Range of Input Data](#). These numerical edit box have they own minimum value and maximum value (range) for validation.

**Thickness** -Enter the thickness (in mm.) of slab.

**Bottom Cover** - Enter the concrete cover (in mm.) at bottom of slab.

**Top Cover** - Enter the concrete cover (in mm.) at top of slab. If the Multiple concrete cover check box in Master Data is not checked, this edit box will be disabled and the value of bottom cover will be assigned to the top cover.

**Short Span** - Enter the span (in M) of slab, if it is two ways slab enter the short way span.

**Long Span** - Enter the long way span (in M) of two ways slab.

**Check Crack Group Box :**

**Exposure class** - Click the combo box to enter the class of exposure.

Class "N/A": no check cracking is needed;

Class "0.1 mm": check cracking with maximum crack width be 0.1 mm;

Class "0.2 mm": check cracking with maximum crack width be 0.2 mm;

Class "0.3 mm": check cracking with maximum crack width be 0.3 mm;

Class "E.W.": perform checking for exposed to weathering cantilever slab according with PNAP173.

**Tension** - Enter the tension force due to side walls of tank (in kN/M).

**Dead Loads Group Box** : Same as Dimension, these numerical edit box have they own [range](#).

**Finishing and Filling** - Enter the weight of finishing and filling (in kN/M<sup>2</sup>) of floor.

**Partition Load** - Enter the weight of uniformly distributed partition (in kN/M<sup>2</sup>).

**Imposed Loads Group Box:**

**Load Class** - There are 6 options you can select.

- 1~5, 7~8;
- 6A;
- 6B;
- 6C;
- 6D;
- 6E.

If you select "1~5, 7~8" or "6A" options, you need to enter the following data.

**Distributed qk** - You can enter the minimum imposed load qk from Table 3.2, 3.4, 3.8 and 3.9 in CoP 2011. For Class 6A, the default value of qk is 3.0 kPa taken from Table 3.4.

**Concentrated Qk** - You can enter the minimum imposed load Qk from Table 3.2, 3.4, 3.8 and 3.9 in CoP 2011. For Class 6A, the default value of Qk is 20.0 kN taken from Table 3.4.

**Effective Width** - Calculate the effective width according with Clause 6.1.3.2 (b) in CoP 2004 and enter to the edit box. The default value is 1.0.

**Permanent Imposed Load** - Check this check box if the imposed load is permanent load, otherwise un-check this check box.

If you select 6B to 6D options, you need to enter the following data.

Imposed Loads		
Load Class	Mid-Span	Support
6B		
Loaded Length	3.000	3.000
Distributed qk	13.900	13.900
Concentrated Qk	30.000	
Effective Width	1.000	

**Loaded Length** - Enter loaded length according with Appendix B of CoP 2011 for mid span and support.

**Distributed qk** - Enter the qk value using formulas in Appendix C or Table 3.6 of CoP 2011 for mid span and support.

**Concentrated Qk** - Enter the Qk value from Table 3.5 of CoP 2011 for mid span and support.

**Effective Width** - Same as above options.

If you select 6E option, you need to enter the following data.

Imposed Loads			
Load Class	6E		
	Mid-Span	Support	
Loaded Length	3.000	3.000	
HA U.D.L.	191.597	191.597	
HA K.E.L.	40.000	Traffic Dir	
Single Wheel Load	100.000	<input checked="" type="radio"/> Short <input type="radio"/> Long	

**Loaded Length** - Same as above option.

**HA U.D.L.** - Enter this data using formulas in Clause 2.10.1 of "Structures Design Manual of Highways and Railways (SDM)".

**HA K.E.L.** - Enter this data according with Clause 3.3.7 (b) in CoP 2011 for mid span and support.

**Single Wheel Load** - Enter data according with Clause 3.3.7 (e) of CoP 2011.

#### Other Loads Group Box:

**Dynamic Load** - Enter the additional vertical imposed load (in kN/M<sup>2</sup>) according with Clause 3.10.2(a) of CoP 2011.

**Uplift Load** - Enter the value of upward load that apply to slab from underground water pressure (in kN/M<sup>2</sup>).

**Point Dead Load** - Enter the concentrated dead load (in kN/M) applied at the end of cantilever slab or the mid span of one way slab.

**Point Live Load (N)** - Enter the concentrated non-permanent live load (in kN/M) applied at the end of cantilever slab or the mid span of one way slab.

**Point Live Load (P)** - Enter the concentrated permanent live load (in kN/M) applied at the end of cantilever slab or the mid span of one way slab.

**Inheriting Input Data** : Check the check box if you want to inherit the common values of previous slab for the default value of the new slab.

**Auto Generate** : If the slab data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input slab data manually, you don't check this check box.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

If you like to input slab data with keyboard only, you can set the input option in [Page and Input Setup](#). It is useful when you are inputting a lot of new data of slabs.

## 6.3 Slab Global Change Sub-command

### 6.3.1 Slab Global Change

The Slab Global Change sub-command allows you to amend the same kind of information about a certain amount of slabs or to copy the whole slabs of any batch to the other batch.

When you choose Slab Global Change from Slab Command or click  button on [Command](#)

[Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Slab Global Change as below.

The Slab Global Change have 3 pages.

1. Global Change Page.
2. Batch Copy Page.
3. Batch Delete Page.

Click the Global Change Tab, **SADS** will display the Global Change Page as below.

#### Select Slabs Group Box :

**Batch Code** - Click the combo box to select the [batch code](#) of those slabs which are going to be changed.

**First Slab** - Click the combo box to select the beginning slab mark you want to change.

**Last Slab** - Click the combo box to select the last slab mark of the changes.

#### Change Parameters Group Box :

The changeable elements include thickness of slab, concrete cover of slab, weight of finishing of floor, weight of uniformly distributed partition, weight of imposed load applied to slab, weight of the dynamic load, weight of up lift load and weight of minimum imposed load. (refer to [Slab Data Sub-command](#)).

You may check the check box and enter the changes in the edit box, if no changes in some fields, just skip it.

**Confirm each change** - This part indicates the way of **SADS** to process the changes. If you wish to confirm the changes on each slab, check the check box, **SADS** will then display the relevant slabs one at a time and prompt you to confirm the changes. Otherwise **SADS** will make the changes thoroughly.

You may search the desired batch code and slab mark using [incremental search](#) in How to use **SADS** topic.

### 6.3.2 Slab Batch Copy

Click the Batch Copy Tab, **SADS** will display the Batch Copy Page as below.

#### Batch Code Group Box :

**Source Batch** - Click the combo box to select the batch code of those slabs which are going to be copy to the other batch.

**Destination Batch** - Click the combo box to select the batch code of those slabs which are going to copy to.

#### Change Slab Mark Group Box :

There are two edit box in a row, the first edit box is the place of prefix slab mark of the source batch, the second edit box is the place of prefix slab mark of the destination batch. Type the prefix of slab mark of the source batch and the destination batch separately.

#### Change Parameters Group Box :

The changeable elements include thickness of slab, concrete cover of slab, weight of finishing of floor, weight of uniformly distributed partition, weight of imposed load applied to slab, weight of the dynamic load, weight of up lift load and weight of minimum imposed load. (refer to [Slab Data Sub-command](#)).

You may check the check box and enter the changes in the edit box, if no changes in some fields, just skip it.

#### Option Group Box :

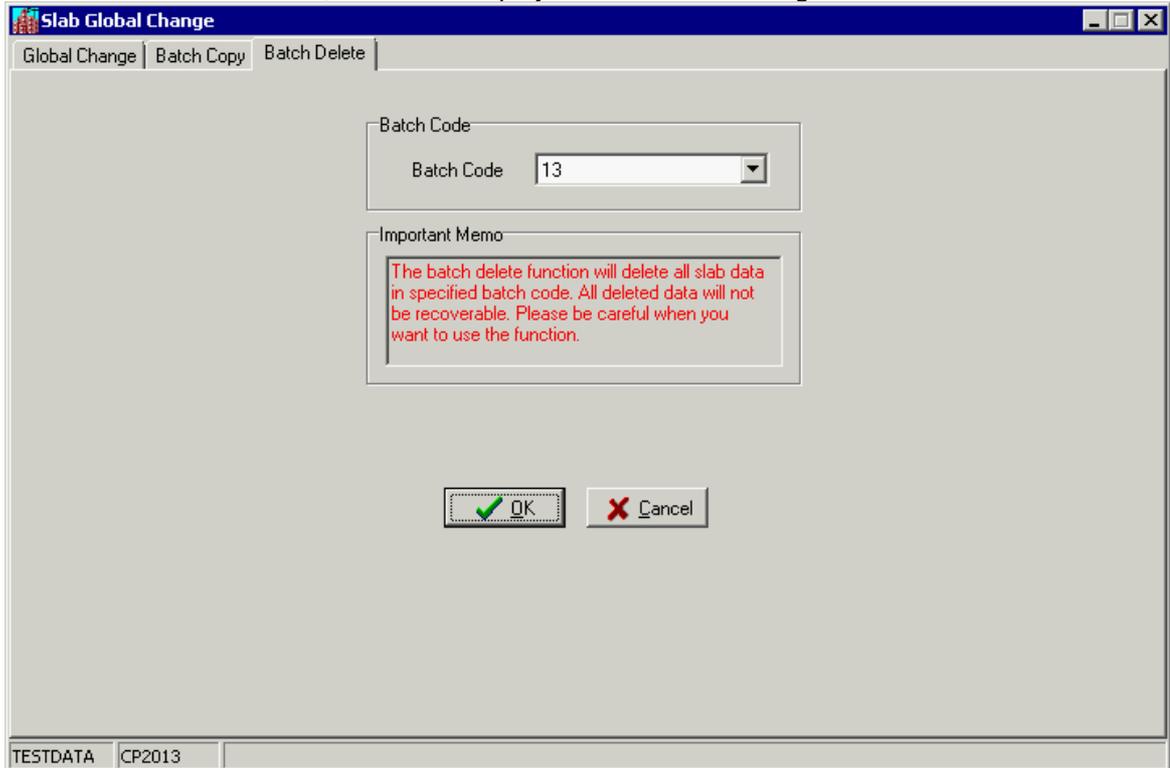
**Clean Slabs in Target batch** - Check the check box if you want to clear all the slabs marks in the destination batch. If not, skip it.

**Overwrite Duplicate Slabs** - If you did not check the above check box, you will continue to select this check box. Check the check box if you want to overwrite all the duplicate slab marks in the destination batch. If not, all the duplicate slab marks will not be copy.

You may search the desired batch code using [incremental search](#) in How to use **SADS** topic.

### 6.3.3 Slab Batch Delete

Click the Batch Delete Tab, **SADS** will display the Batch Delete Page as below.



**Batch Code** - Click the combo box to select the batch code of those slabs which are going to be deleted. The deleted slab data will not be recoverable. You should use the function carefully.

## 6.4 Print Slab Reports Sub-command

The Print Slab Reports Sub-command allows you to print out or display the slab data, slab thickness or slab reactions at the supports for checking or other purposes.

When you choose Slab Reports from Slab command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Slab Reports window as below.

No	Batch Code	First Slab	Last Slab
1	UR	US1	US1
2	RF	RS1	RS4
3	13	13S1	13S4
4	TF	TS1	TS4
5	2F	2S1	2S4
6	1A	WS1	WS1
7	1F	1S1	1S6
8	GR	GS1	GS4
9	BS	BS1	BS4
10			
11			
12			
13			
14			
15			
16			
17			
18			

**Print Options Group Box:**

**Beginning Page Number** - Enter the numerical number of the first page.

**Prefix of Page Number** - Enter up to 2 alphanumerical characters long for the precedent of the page number. **SADS** set the default page mark as "S", you may change it as you wish.

**Print Mode** - **SADS** offers two options for your choice. Click the radio button of "Print to Printer", if you want to print out the selected slab data / thickness or reaction to the printer. Click the radio button of "Print to File", if you want to print to the temporary file and automatically display on screen.

**Print Jobs Group Box:**

**Batch Code** - Click the combo box to select the [batch code](#) for the print job.

**First Mark** - Click the combo box to select the beginning slab mark which going to be reported.

**Last Mark** - Click the combo box to select the last slab mark which going to be reported. You may use [incremental search](#) to select the desired batch codes and beam marks

**Report Type Group Box** : Click the radio button and select the subject you want. There are 3 subjects:

**Slab Input Data** - print or display the slab data for your checking.

**Slab Thickness** - print or display a listing of labs thickness for the reference to architects.

**Slab Reaction** - print or display the reactions of slabs at the supports for your reference or for the checking purpose.

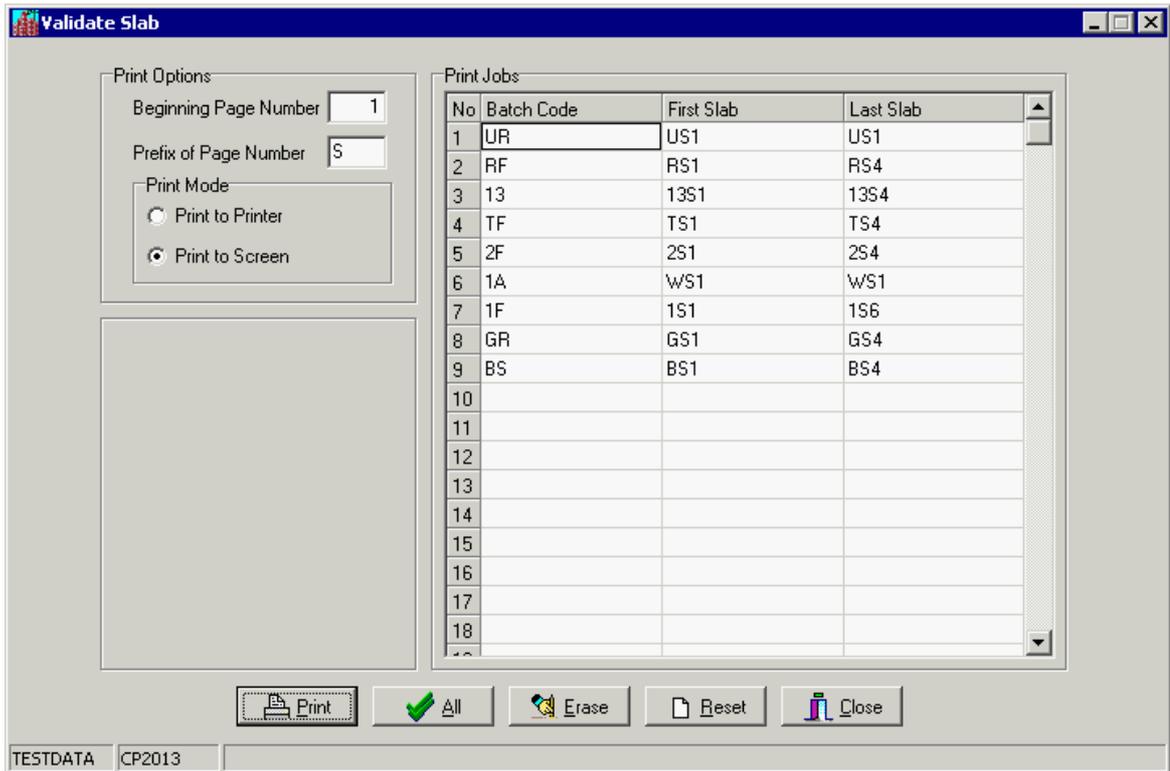
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 6.5 Validate Slab Data Sub-command

The Validate Slab Data Sub-command is use to make a validation about the slab data you provided. **SADS** will print out or display all the incorrect data after finish the procedure.

When you choose Slab Validation from Slab command of the Module menu or click  button

on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Validate Slab Data as below.



**Print Options Group Box** : Refer to the [Print Slab Report Sub-command](#).

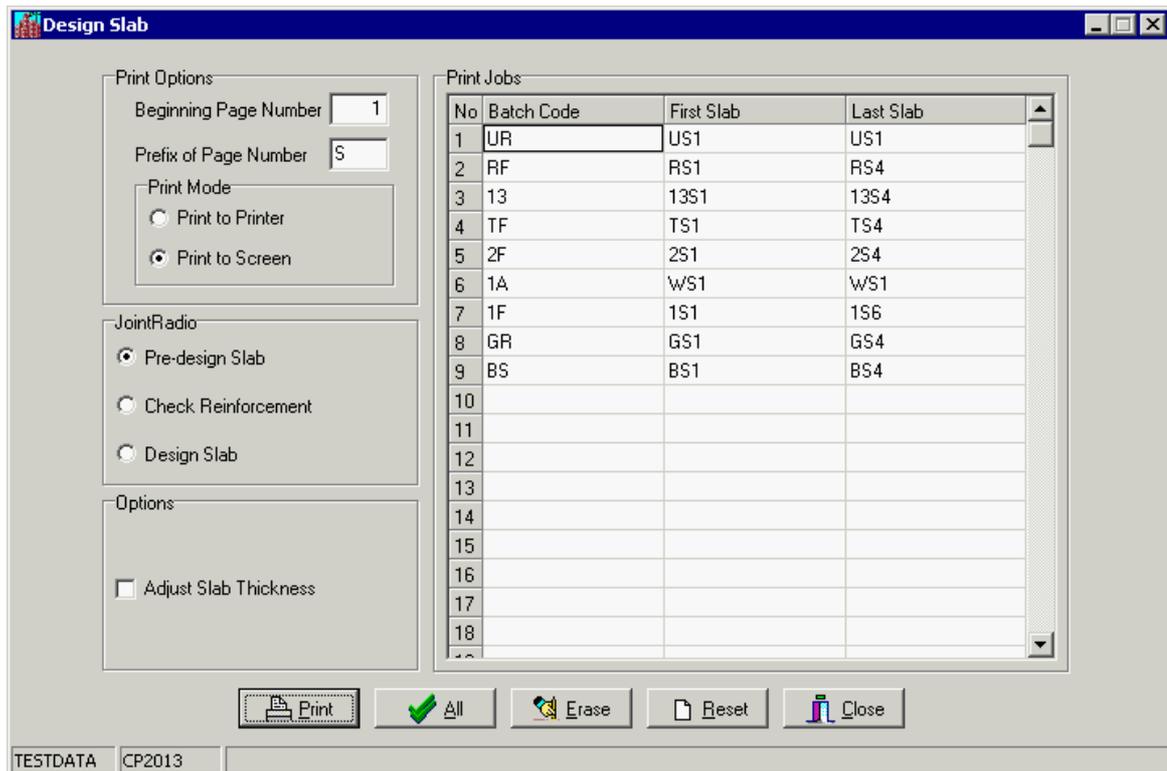
**Print Jobs Group Box** : Refer to the [Print Slab report Sub-command](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 6.6 Design Slab Sub-command

The Design Slab Sub-command is use to check the thickness of slab, to calculate the support shears and reinforcement of slabs, also to print out the calculation of slabs of the building for the submission to B.D.

When you choose Slab Design from Slab command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Slab Design as below.



**Print Options Group Box** : Refer to the [Print Slab Report Sub-command](#).

**Print Jobs Group Box** : Refer to the [Print Slab report Sub-command](#).

**Report Type Group Box** : Click the radio button and select the Pre-design Slabs or Design Slabs.

**Pre-design Slab** - The Pre-design Slab enables you to check the slab thickness, to calculate the support shears and reinforcement of slabs which you have created. **SADS** will give you a report about which slab thickness is not enough and increases the relevant slabs thickness automatically according to the requirement of the calculation. You may amend these values to the corresponding slab marks by using the [Maintain Slab Data Sub-command](#). If you check the Adjust Slab Thickness check box, **SADS** will amend these slab thickness automatically.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars of slab and don't want to alter the bar sketch that generated by pre-design option and edited by you. **SADS** will generate a report if some of slab sections are under designed. Before you run this option, you must make sure all slabs have been pre-designed before. If you check the Adjusting Reinforcement check box, all under designed reinforced bars will be increased automatically.

**Design Slab** - The Design of Slab allows you to print out the calculation of slabs in the building for the submission to B.D. There is an "Print All States" check box you can select. If you check this check box, **SADS** will print more detail print out for study or answer questions raised by BD. But, you should not print this detail report for submitting your drawing.

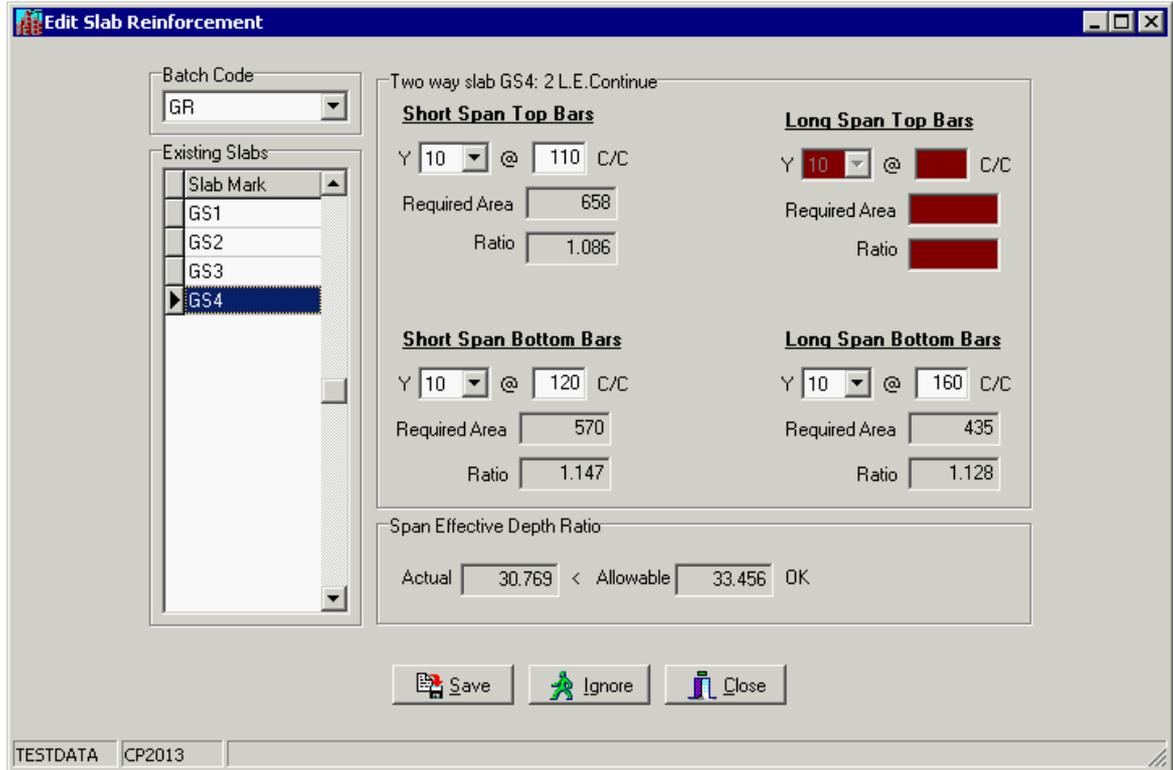
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 6.7 Edit Slab Sketch Sub-command

The Edit Slab Sketch Sub-command is use to edit the bar sketch of slab. If the span effective depth ratio of slab is not matched the requirement of CoP 2004, you may use this sub-command to adjust the area of main bar to increase the span effective depth ratio.

When you choose Slab Bar Edit from Slab command of the Module menu or click  button on

Command Button Bar then click  button on [Sub-command Button Bar](#), SADS will display the Edit Slab Reinforcement as below.



**Batch Code** - Select the desired batch code from the combo box.

**Existing Slabs** - Select a slab that you want to edit.

You can adjust any bar diameter or bar spacing. If the Ratio becomes red color, it shows the adjusted bars are under designed.

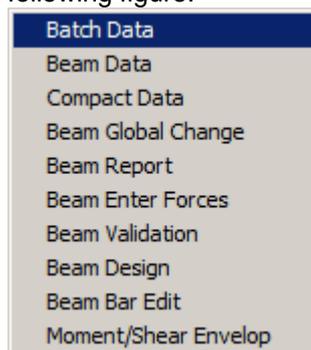
If you need to increase the Allowable span effective depth ratio for cantilever slab, you can increase the bar diameter or decrease the bar spacing of top bars. For slab supported on both ends, you need to increase the bar diameter or decrease the bar spacing of bottom main bars.

## 7 Beam Command

### 7.1 About Beam Command

In the Beam Command, you can supply beams data, edit beams data, validate beams data, pre-design beam section, generate beam sketches, design the reinforced bar of beams and drawing beams sketch.

When you choose Beam command from the Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the beam sub-command buttons are display as below.



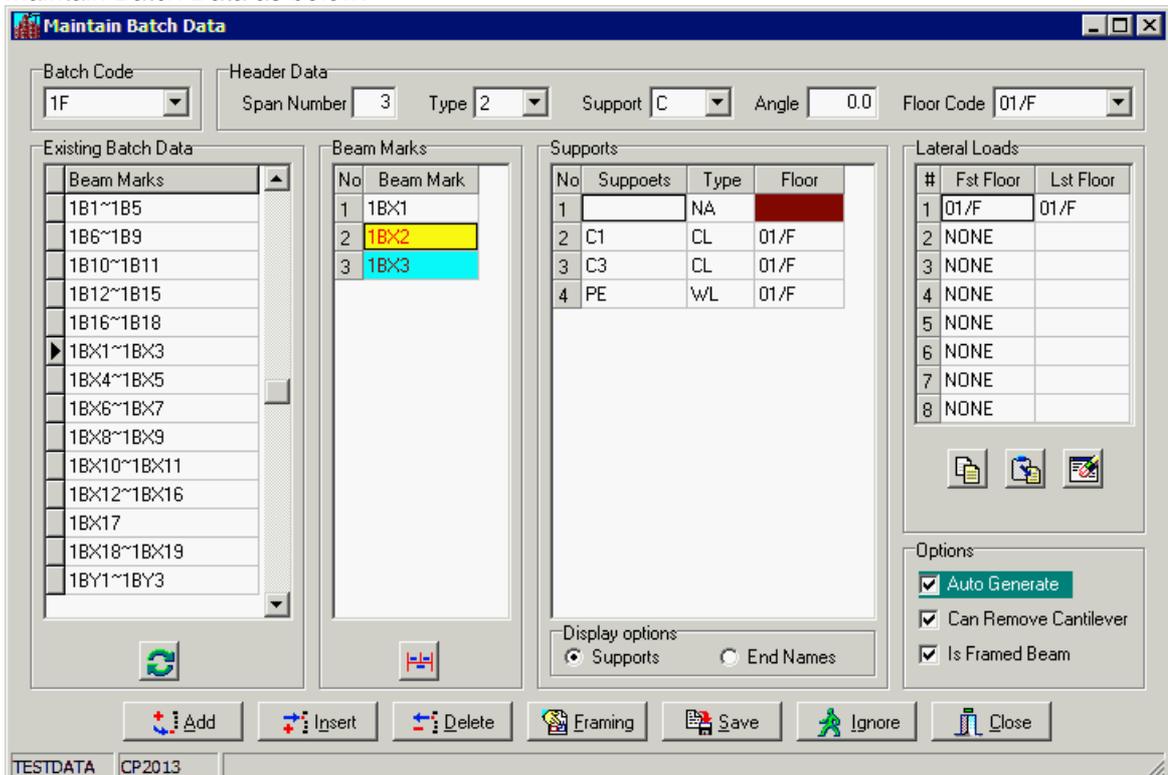
The Sub-commands are:

1. Maintain Batch Data Sub-command
2. Maintain Beam Data Sub-command.
3. Compact Beam Data.
4. Beam Global change Sub-command.
5. Enter Beam Forces Sub-command
6. Print Beam Reports Sub-command.
7. Validate Beam Data Sub-command.
8. Design Beam Sub-command.
9. Edit Beam Sketch Sub-command.
10. Moment and Shear Envelop Sub-command.

## 7.2 Maintain Batch Data Sub-command

The Maintain Batch Data sub-command is use to define the whole circumstances about continuous beams of the building in each batch code for the requirement of calculation. Each continuous beam must has a batch data, even it is a simply supported beam. The batch data consists of beam span number, type of continuous beam, information of support, wind loads applied to beam, etc., which combined together for the detail of a continuous beam.

When you choose Batch Data from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Maintain Batch Data as below.



**Batch Code** - Click the combo box contains a listing of batch codes that created in [Batch Code Sub-command](#). You may search the desired batch code using [incremental search](#) in How to use **SADS** topic.

**Existing Batch Data Group box** - The list box lists the names of all batch data in selected batch code. If you want to search the desired batch data, you may use [incremental search](#)

described in How to use **SADS** topic. There is a  button under the box, so you can rearrange the order of the existing batch data using [re-arrange marks](#) in How to use **SADS** topic.

**Header Data Group Box** : This group include a series of information use to define the whole circumstances of continuous beam.

**Span Number** - Enter the span number of a continuous beam. **SADS** provides the maximum span number is 21.

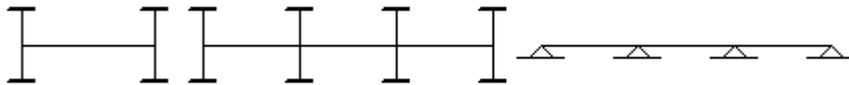
**Type** - Click the combo box and select the type of continuous beam. **SADS** defined the type in 5 different kinds, you may type the number in this field. (i.e., type "0" for single span simply supported beam). The following figure shows you graphically about the type of continuous beam.

- 0 -- Indicates single span simply supported beam;
- 1 -- Indicates continuous beam in that the both ends are supported;
- 2 -- Indicates continuous beam that the left end is cantilever;
- 3 -- Indicates continuous beam that the right end is cantilever;
- 4 -- Indicates continuous beam that the both ends are cantilever.

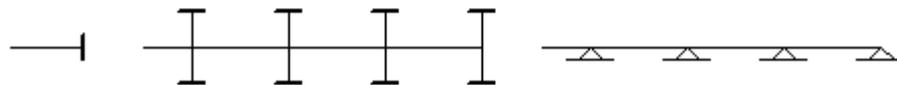
0: Single span simply supported beam.



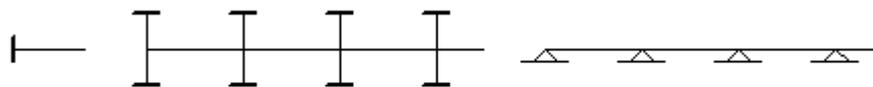
1: Continuous beam which both ends are supported.



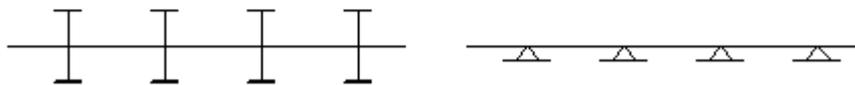
2: Continuous beam which left end is cantilever.



3: Continuous beam which right end is cantilever.



4: Continuous beam which both ends are cantilever.



**Support** - Click the combo box and select the condition of continuous beam, **SADS** defined as N, C and B. You may select the correspondence symbol in it.

"N" -- Indicates all supports of continuous are hinged and no need to enter support mark..

"C" -- Indicates the supported of continuous beam contain columns.

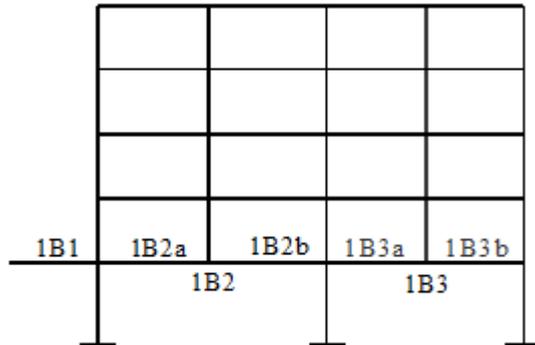
"B" -- Indicates the supported of continuous beam are beams or walls, and you want to enter the support marks.

**Angle** - The inclined angle of continuous beam.

**Floor Code** - Click the combo box and enter the [floor code](#) of the continuous beam. If the type of batch data is "0" or the support of batch data is "N" or "B", this box will be disabled.

**Beam Mark Group Box** : Enter the marks of continuous beam of the batch data. The order

should be from left to right. If it is use on the girder that support any column as shown in below figure, **SADS** named the girder as 1B2. From the point of frame analysis the girder should be consider as two elements, it should have two difference marks. **SADS** named them as "associate beams" e.g. 1B2a and 1B2b, there may up to 10 associate beams on one girder. If you had previously defined the girder and entered the associate beam data, then the beam mark changed to cyan base and red letter, as the displayed of above figure.



If the beam is a girder, click  button, **SADS** will display the dialog box show as below and allow you to enter the information in it.

Enter the name of associate beams, the "End" number of left end of associate beam and the length of each associate beam (the overall lengths of associate beams must equal to the length of the girder). The value of End will be generated when you run Collect function in [Link Online Sub-command](#).

Besides, in the output of Beam design sub-command, **SADS** will only shown the girder as beam GB1, no GB1a or any associate beam.

**Note:** When input relevant column data of the girder, you should enter the girder mark rather than the associate beam mark, i.e. GB1 for column C1 and C3 and the width of column C2 on ground floor should be zero. The associate beam marks will be shown only in the frame sketch.

**Support Group Box :** Enter the support marks, support types and floor code of the continuous beam.

**Support** - Enter the name of the support.

**Types** - Select the type of the support.

**CL** -- If the support is column;

**BM** -- If the support is beam;

**HN** -- If the support is hinge;

**WL** -- if the support is hinge wall;

**FX** -- If it is a fixed end (fixed wall);

**NA** -- If it is a free end.

**Floor** - The floor code where the column or wall located.

**Note:** if the display option is set to End Names, the CL is the end number of column or wall.

The value of End will be generated when you run Collect function in [Link Online Sub-command](#).

**Lateral Load Group Box :** This group consists two elements, first floor code and last floor code.

Click the Combo box and select the first floor code and the last floor code which should be considered the wind load, dynamic load and soil load in the calculation of the continuous beam. **SADS** provides up to 8 cases in a continuous beam, and will automatically find out the worse case for the calculation of the continuous beam.

**First floor code** indicates the top level of every case.

**Last floor code** indicates the bottom level of every case.

You may use [incremental search](#) to select the desired floor codes. If you want to copy the First

floor codes and Last floor codes to other batch data, you may click the  button to copy these floor codes to clipboard. When you open batch code that has the same list of floor

codes, you may click the  button to copy these floor codes from clipboard to Lateral Loads grid box. If you want to reset the first floor codes and last floor codes to NONE, you may click the  button.

**Auto Generate** : If the batch data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input batch data manually, you don't check this check box.

**Can Remove Cantilever**: If you check this check box, SADS follows the requirement of Clause 9.4.4 in CoP 2013. You can demolish or replace any cantilever structures without affecting the safety and integrity of the main structure of the building. If you are sure the cantilever structure never be demolished or replaced, you can uncheck this check box.

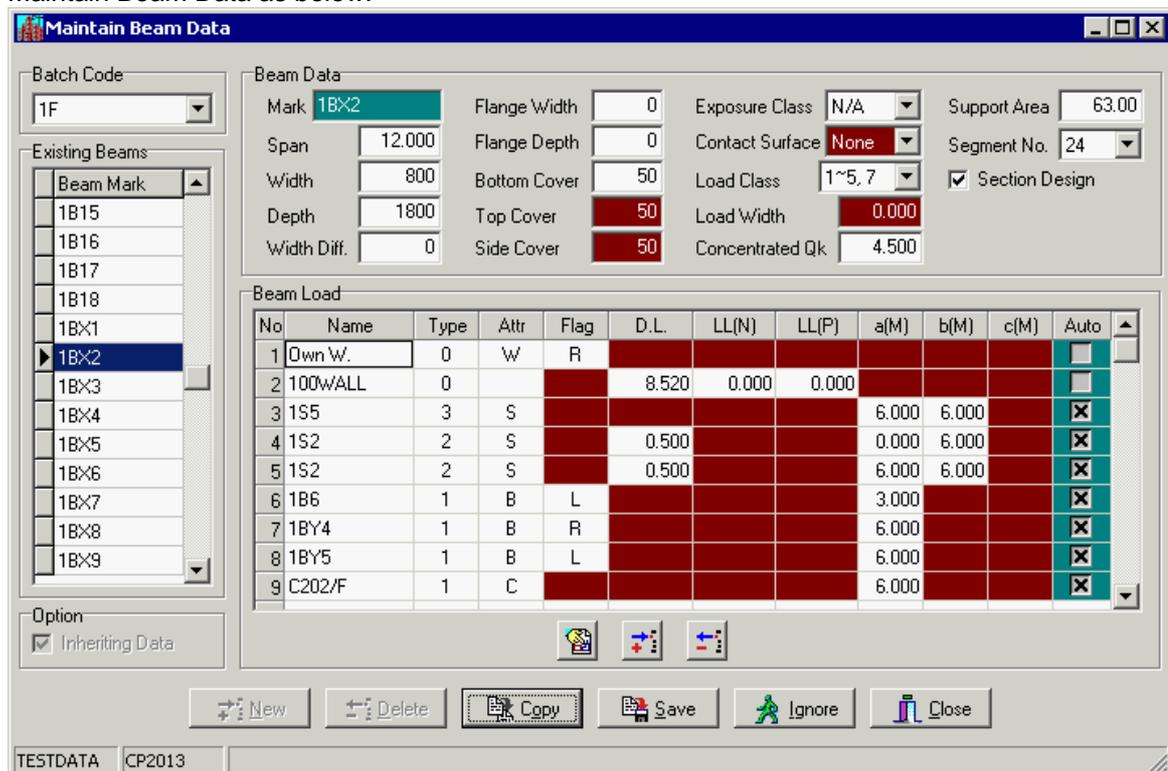
**Is Framed Beam**: If you are using ETABS Online Linking and you need to include this continuous beam to ETABS model, you should check this check box. Otherwise, you may un-check it.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing. If you have collect ETABS output data, you may click the Framing button to show the framing plan that will be transferred to ETABS application.

### 7.3 Maintain Beam Data Sub-command

The Maintain Beam Data sub-command is use to create a new beam data, amend an existing beam data you provided.

When you choose Beam Data from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Maintain Beam Data as below.



**Batch Code**: 1F

**Existing Beams**: 1B15, 1B16, 1B17, 1B18, 1Bx1, **1Bx2**, 1Bx3, 1Bx4, 1Bx5, 1Bx6, 1Bx7, 1Bx8, 1Bx9

**Beam Data**

Mark: 1Bx2, Flange Width: 0, Exposure Class: N/A, Support Area: 63.00  
 Span: 12.000, Flange Depth: 0, Contact Surface: None, Segment No.: 24  
 Width: 800, Bottom Cover: 50, Load Class: 1~5.7, Section Design:   
 Depth: 1800, Top Cover: 50, Load Width: 0.000  
 Width Diff.: 0, Side Cover: 50, Concentrated Qk: 4.500

**Beam Load**

No	Name	Type	Attr	Flag	D.L.	LL(N)	LL(P)	a(M)	b(M)	c(M)	Auto
1	Own W.	0	W	R							<input type="checkbox"/>
2	100WALL	0			8.520	0.000	0.000				<input type="checkbox"/>
3	1S5	3	S					6.000	6.000		<input checked="" type="checkbox"/>
4	1S2	2	S		0.500			0.000	6.000		<input checked="" type="checkbox"/>
5	1S2	2	S		0.500			6.000	6.000		<input checked="" type="checkbox"/>
6	1B6	1	B	L				3.000			<input checked="" type="checkbox"/>
7	1BY4	1	B	R				6.000			<input checked="" type="checkbox"/>
8	1BY5	1	B	L				6.000			<input checked="" type="checkbox"/>
9	C202/F	1	C					6.000			<input checked="" type="checkbox"/>

**Option**:  Inheriting Data

Buttons: New, Delete, Copy, Save, Ignore, Close

Status: TESTDATA CP2013

**Batch Code** - There are two parts of batch code, first part is named as "ALL", **SADS** listed all the existing beam marks that you already supplied the beam data previously and sorted all the existing beam marks according to the ascending sequences of the alpha numerical characters in " ALL" batch code. Only in this batch code you can add and delete the existing beam marks

and copy the existing beam data by using the button keys "New", "Delete" and "Copy".  
 Second part is the listing of the batch codes of the building that you provided in the [Batch Code Sub-command](#) of the System Command, and contains the beam marks you previously created in the [Batch Data Sub-command](#). In these batch code you can only make an amendment about the existing beam.

**Existing Beam Mark** - The list box is the listing of the relevant beam marks of the selected batch code.

You may search the desired batch code and the desired beam mark using [incremental search](#) described in How to use **SADS** topic.

If there is a colored change (yellow base and red letter) appears on the listing of a certain batch code (except in "ALL" batch code), that means for some reason you have not enter the data of that beam.

**Beam Data Group Box** : This box is about the general information of the beam.

**Beam Mark** - Enter the alpha numerical up to 10 characters long for the beam mark. The beam mark cannot be duplicated in a job.

**Span** - Enter the value of the span, unit: M.

**Width** - Enter the width of beam section, unit: mm.

**Depth** - Enter the depth of beam section, unit mm.

**Width Different** - Enter the difference between top size and bottom size of the beam section which is trapezoidal, unit: mm.

**Flange Width** - Enter the width of flange, unit: mm. If the section is rectangular, the value should be "0".

**Flange Depth** - Enter the depth of flange, unit: mm.

**Bottom Cover** - Enter the concrete cover of reinforcement bars at the bottom of beam, unit: mm.

**Top Cover, Side Cover** - Enter the concrete cover of reinforcement bars at the top and side of beam, unit: mm. If the Multiple concrete cover check box in [Master Data](#) is not checked, these 2 edit boxes will be disabled and the value of bottom cover will be assigned to top cover and side cover.

**Exposure class** - Click the combo box to enter the class of exposure.

Class "N/A": no check cracking is needed;

Class "0.1 mm": check cracking with maximum crack width be 0.1 mm;

Class "0.2 mm": check cracking with maximum crack width be 0.2 mm;

Class "0.3 mm": check cracking with maximum crack width be 0.3 mm;

Class "E.W.": perform checking for exposed to weathering cantilever beam according with PNAP173.

**Contact Surface** - If the exposure class is "A" or "B", click the combo box and select "U", "L" or "B". "U" indicates upper surface of the beam contacts with water, "L" indicates the lower surface, "B" indicates both surfaces. If the exposure class is "C", select "N".

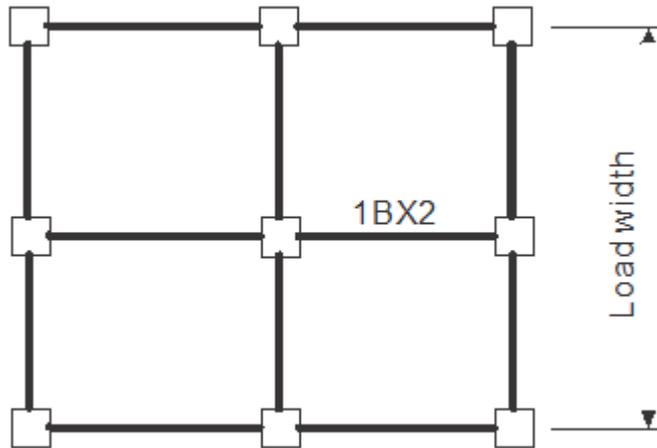
**Load Class** - There are 7 options you can select.

- 1~5, 7
- 6A
- 6B
- 6C
- 6D
- 6E
- 8\*

If you select option 1~5, 7, 6A or 8\*, the load width data is not necessary. The edit box is disabled. Please note, the option 8\* includes only item 2, 3 and 4 in Class 8 of Table 3.9 of CoP 2011. The minimum load  $Q_k$  of these items will be applied to beam as line load instead of point load. If your case is item 1, 5 or 6, please select 1~5, 7 option to apply the minimum load as point load to beam.

If you select Class 6B to 6E, you need to enter the value of load width.

**Load Width** - See the picture shown below (in M) for load width of beam 1BX2.



**Concentrated Qk** - Enter the minimum imposed load Qk from CoP 2011, unit: kN.

**Support Area** - If the area supported by the beam is equal to or greater than 45 M<sup>2</sup> and the loading is not included in Clause 3.7.1(a), (b), (d), (f), (g) and (h), you may enter the area.

**SADS** will calculate the percentage reduction of total distributed imposed load and deduct the value imposed load for section design. **SADS** can detect the vehicle load and dynamic load and not deducts these values automatically.

**Segment No** - Enter the segment number of the beam. The default values can pre-define in Default Segment in [Beam\(2\) page](#) of Master Data.

**Section Design** - Check the check box if you want **SADS** automatically design the beam section and generate the bar sketch of the beam. Otherwise do not check this check box.

**Beam Load Group Box** : This box is about the loads information which applied to the beam, **SADS** provides up to 40 loadings applied on each beam.

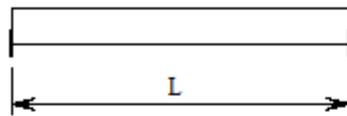
**Name** - Enter the name of load. If it is slab or beam, the load name must be exactly same as the slab mark or beam mark which have been previously defined. If it is a column, the load name should be the column mark and the floor code (i.e. K1ROOF , C11ST., D23RD.).

**Type** - Enter the type of load which applied on the beam. **SADS** defined the loading type as followed:

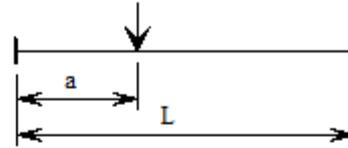
- 0 -- uniformly distributed load on full span, unit: kN/M.
- 1 -- concentrated load, unit: kN.
- 2 -- uniformly distributed load, unit: kN/M.
- 3 -- triangular distributed load, unit: kN/M.
- 4 -- trapezoidal distributed load, unit: kN/M.
- 5 -- right triangular distributed load (right), unit: kN/M.
- 6 -- right triangular distributed load (left), unit: kN/M.
- 7 -- concentrate moment load, unit: kN-M

The graphic of the load types and the relevant dimensions a, b and c are shown in below.

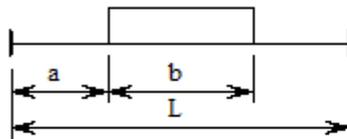
0: Uniformly distributed load on full span.



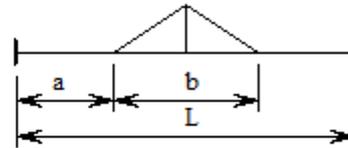
1. Concentrated load.



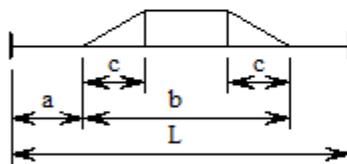
2. Uniformly distributed load



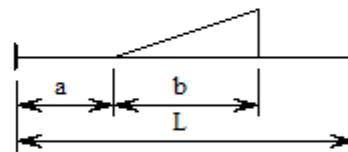
3. Triangular distributed load



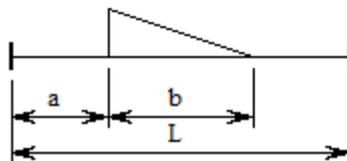
4. Trapezoidal distributed load



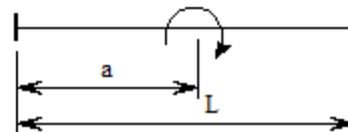
5. Right triangular distributed load



6. Right triangular distributed load



7. Concentrated moment



**Attribute** - Click the combo box and select the source of loading. "W" denotes own weight, "B" denotes beam, "S" denotes slab, "C" denotes column, **SADS** will automatically extract the reactions upon them. "H" denotes H.A. loading, "Y" denotes dynamic load, "U" denotes uplift load, you may enter these loading to the appropriate dead load box. If you do not want **SADS** automatically extract the reactions, select blank " ", then you may enter the dead load and live load of the loading in the appropriate box.

**Flag** - Click the combo box and select the characteristic of the loading. For own weight, you may select "R" "T" "L", "R" denotes rectangular section, "T" denotes T-section, "L" denotes L-section. For beam, you may select "R" "L", "R" denotes right hand side reaction, "L" denotes left hand side reaction. If the "Load Type" is 3 or 4, the Attribute is "S" i.e. Slab, you may select "C" or "D", "C" denotes continuous slab, "D" denotes discontinuous slab.

**D.L.** - Enter the value of dead load if the "Attribute" you select is blank " ". If the "Load Type" is 0 or 2, and the Attribute is "S" i.e. Slab, then you may enter the "shear force coefficients" in this field, the default value is "0.5", you may modify it as you wish.

**LL(N)** - Enter the value of non-permanent imposed load if the "Attribute" you select is blank " ".

**LL(P)** - Enter the value of permanent imposed load if the "Attribute" you select is blank " ".

**a(M)** - Enter the value of the distance from the left end of beam to the position of concentrated load or the beginning of distributed load, unit: M.

**b(M)** - Enter the value of the length of distributed load, unit: M.

**c(M)** - Enter the value of the length of the triangular part of trapezoidal distributed load, unit M.

**Auto** - If the beam load is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input beam load manually, you don't check this check box.

If you want to view graphically about the existing loading of the beam, click  key, **SADS** will then graphically display the loading on the dialog box.

If you want to insert a loading in front of the existing load, you may highlight the existing one

and click  key, **SADS** will provide a row enable you to insert a new loading.

If you want to delete an existing loading, highlight the loading and click  key, **SADS** will then delete the highlighted load.

**Inheriting Data Option** - If you want to inherit the basic data of the previous beam data for the new beam, check the check box.

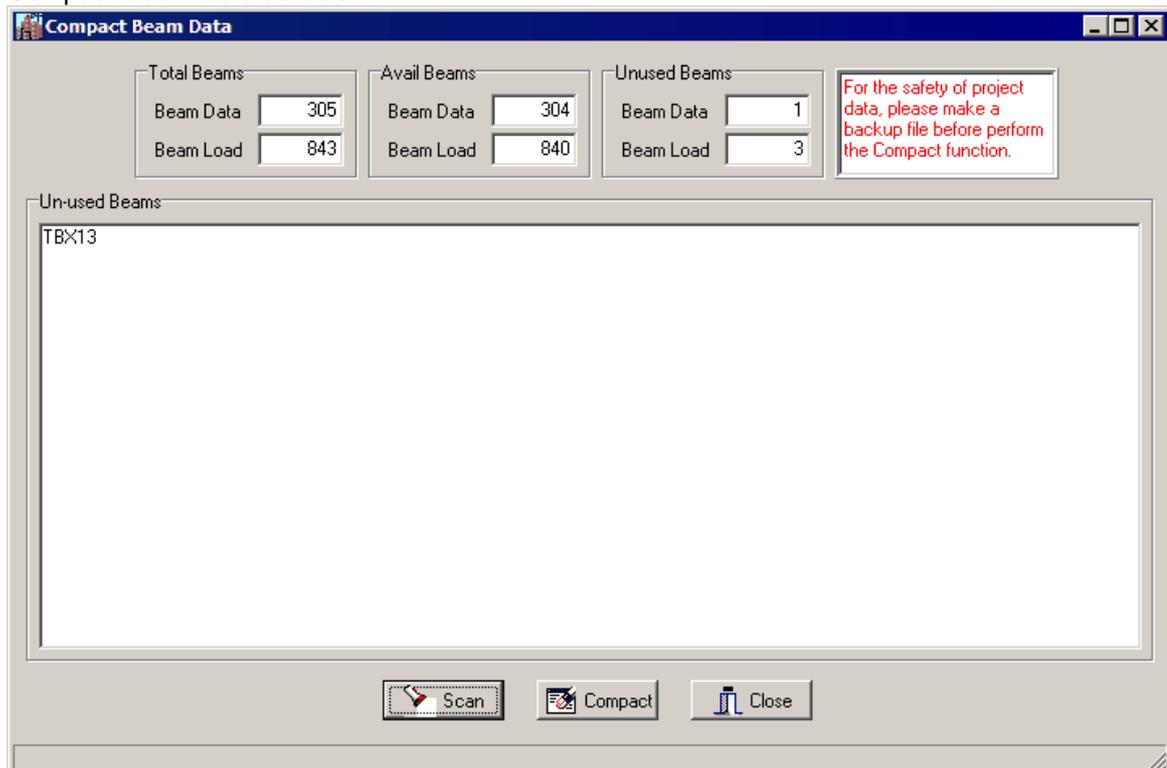
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

If you like to input beam data with keyboard only, you can set the input option in [Page and Input Setup](#). It is useful when you are inputting a lot of new data of beams

## 7.4 Compact Beam Data

When you have a huge project and you have changed the project data frequently, the project data may contain many unused data. If you prefer to clean up these unused data, you can run Compact Beam Data Sub-command.

When you choose Batch Data from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Compact Beam Data as below.



The first is clicking Scan button. SADS scans the unused beam data and beam loads. You can see the number of unused beam data and beam loads. You can see the marks of unused beams also.

If you see the number of unused beam is low, you can click the Close button to exit the sub-command. If the number is large enough, you may consider to click the Compact button to delete the unused beam data and beam loads.

**IMPORTANT NOTES:** Please run the Backup Data Sub-command before you click Compact button. the compact function delete unused beam data and beam loads permanently and can't be recovered.

## 7.5 Beam Global Change Sub-command

### 7.5.1 Beam Global Change

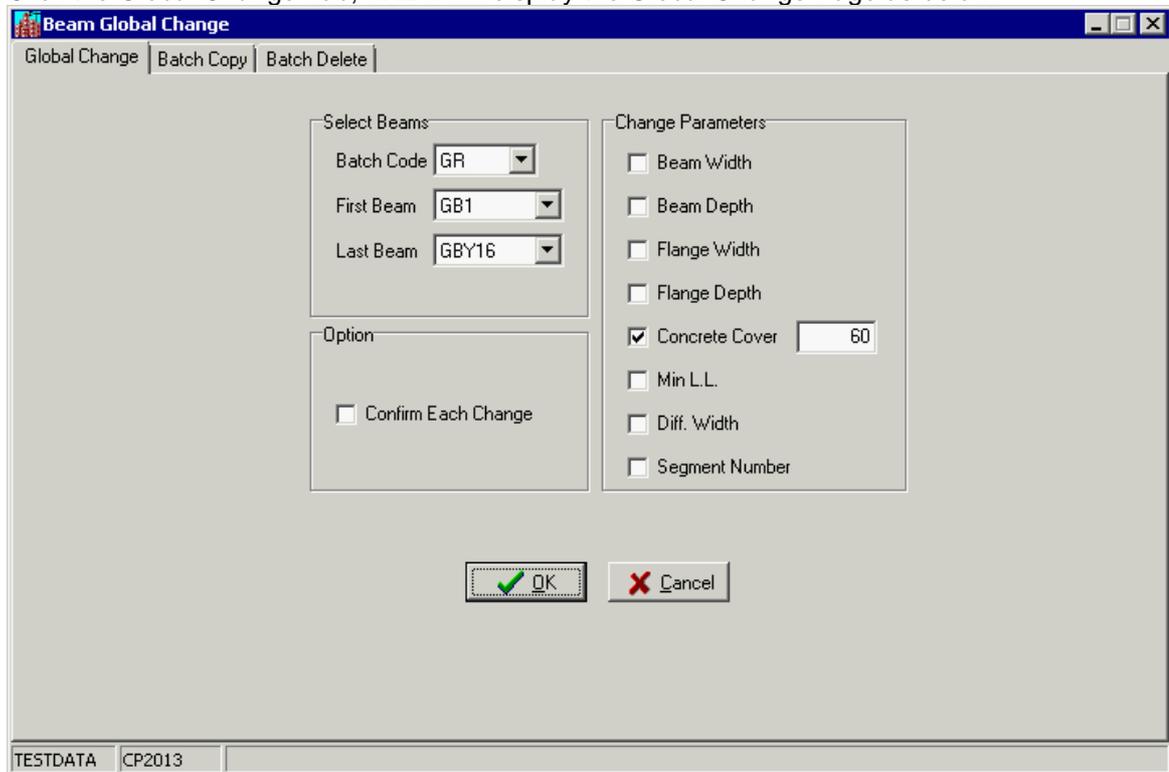
The Beam Global Change sub-command enables you to amend some changes which contain of a same value to a large amount of beams or to copy the whole [beams data](#) and [batch data](#) from one batch to the other batch.

When you choose Beam Global Change from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Beam Global Change.

The Beam Global Change have two pages.

1. Beam Global Change Page.
2. Beam Batch Copy Page.
3. Beam Batch Delete Page.

Click the Global Change Tab, **SADS** will display the Global Change Page as below.



#### Select Beams Group Box :

**Batch Code** - Click the combo box to select the [batch code](#) of those beams which are going to be changed.

**First Beam** - Click the combo box to select the beginning beam mark you want to change.

**Last Beam** - Click the combo box to select the last beam mark of the changes.

#### Change Parameters Group Box :

The change parameters include beams width, beams depth, flange width, flange depth, concrete cover of beams, minimum imposed load of beams, the difference between top size and bottom size in trapezoidal section, the segment number. You may check the check box and enter the changes in the edit box, if no changes in some fields, just skip it.

**Confirm each change** - This part indicates the way of **SADS** to process the changes. If you wish to confirm the changes on each beam, check the check box, **SADS** will then display the

relevant beams one at a time and prompt you to confirm the changes. Otherwise **SADS** will make the changes thoroughly.

## 7.5.2 Beam Batch Copy

Click the Batch Copy Tab, **SADS** will display the Batch Copy Page as below.

### Batch Code Group Box :

**Source Batch** - Click the combo box to select the [batch code](#) of those beams which are going to be copy to the other batch.

**Destination Batch** - Click the combo box to select the [batch code](#) of those beams which are going to copy to.

### Change Beam Mark Group Box :

There are two edit box in a row, the first edit box is the place of prefix [beam mark](#) of the source batch, the second edit box is the place of prefix beam mark of the destination batch. Type the prefix of beam mark of the source batch and the destination batch separately.

### Change Load Name Group Box :

Same as above, there are two edit box in a row, the first edit box is the place of prefix [load name](#) of the source batch, the second edit box is the place of prefix load name of the destination batch. Type the prefix of load name of the source batch and the destination batch separately.

### Change Floor Code Group Box :

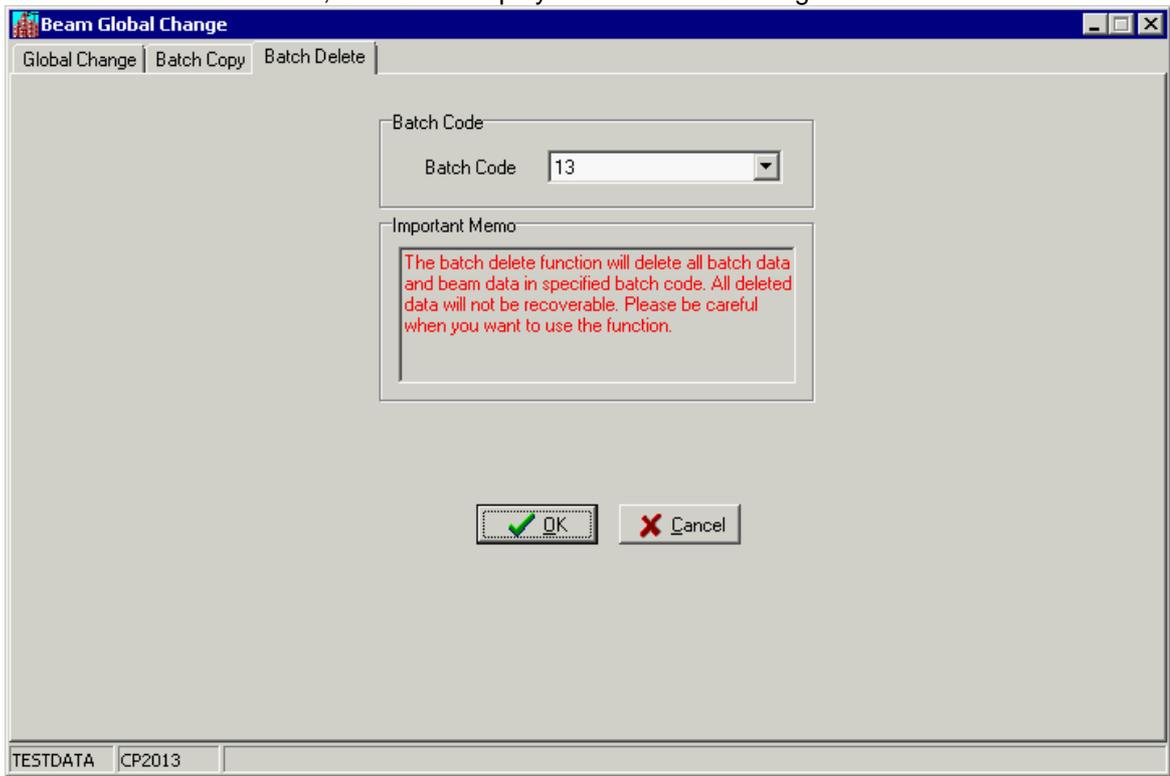
Same as above, the first edit box is the place of [floor code](#) of the source batch, the second edit box is the place of floor code of the destination batch. Type the floor code of the source batch and the destination batch separately.

### Change Support Mark Group Box :

The first edit box is the place of prefix support mark of the source batch, the second edit box is the place of prefix support mark of the destination batch. Type the prefix of support mark of the source batch and the destination batch separately.

### 7.5.3 Beam Batch Delete

Click the Batch Delete Tab, **SADS** will display the Batch Delete Page as below.



**Batch Code** - Click the combo box to select the batch code of those beams which are going to be deleted. The deleted beam data will not be recoverable. You should use the function carefully.

## 7.6 Print Beam Reports Sub-command

The Print Beam Reports Sub-command allows you to print out or display the batch data, beams data, beams section, beams moments, beams forces and plot the bar sketch for checking or other purposes.

When you choose Beam Reports from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Beam Reports as below.

No	Batch Code	First Beam	Last Beam
1	UR	UB1	UB1
2	RF	RB1~RB4	RB11~RB12
3	13	13B1~13B4	13BY9~13BY10
4	TF	TB1~TB4	TBY11~TBY12
5	2F	2B1~2B4	2BY11~2BY12
6	1A	WB1	WBY2
7	1F	1B1~1B5	1BY18~1BY19
8	GR	GB1~GB4	GBY15~GBY16
9	BS	BB1~BB4	BBY15~BBY16
10			
11			
12			
13			
14			
15			
16			
17			
18			

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "B".

#### Print Jobs Group Box:

**Batch Code** - Click the combo box to select the [batch code](#) for the print job..

**First Mark** - Click the combo box to select the beginning beam mark which going to be reported.

**Last Mark** - Click the combo box to select the last beam mark which going to be reported. You may use [incremental search](#) to select the desired batch codes and beam marks.

**Report Type Group Box :** Click the radio button and select the subject you want. There are 6 subjects in the box:

**Print Batch data** - print or display the batch data for your checking.

**Print Beam data** - print or display the beam data for your checking.

**Print Beam section** - print or display the section of beams for the reference to architects.

**Print F.E.M. and reaction** - print or display the fixed end moment and shears for your reference or for the checking purpose.

**Print Lateral Forces** - print or display the moment and shear produced by lateral load for your checking.

**Plot bar sketch** - plot or display the bar sketch of beam for your reference or for the checking purpose.

**Print Moment and Reinforcement** - print the hogging moments and reinforcement at LHS and RHS of beam, print the maximum sagging moment and reinforcement at mid span.

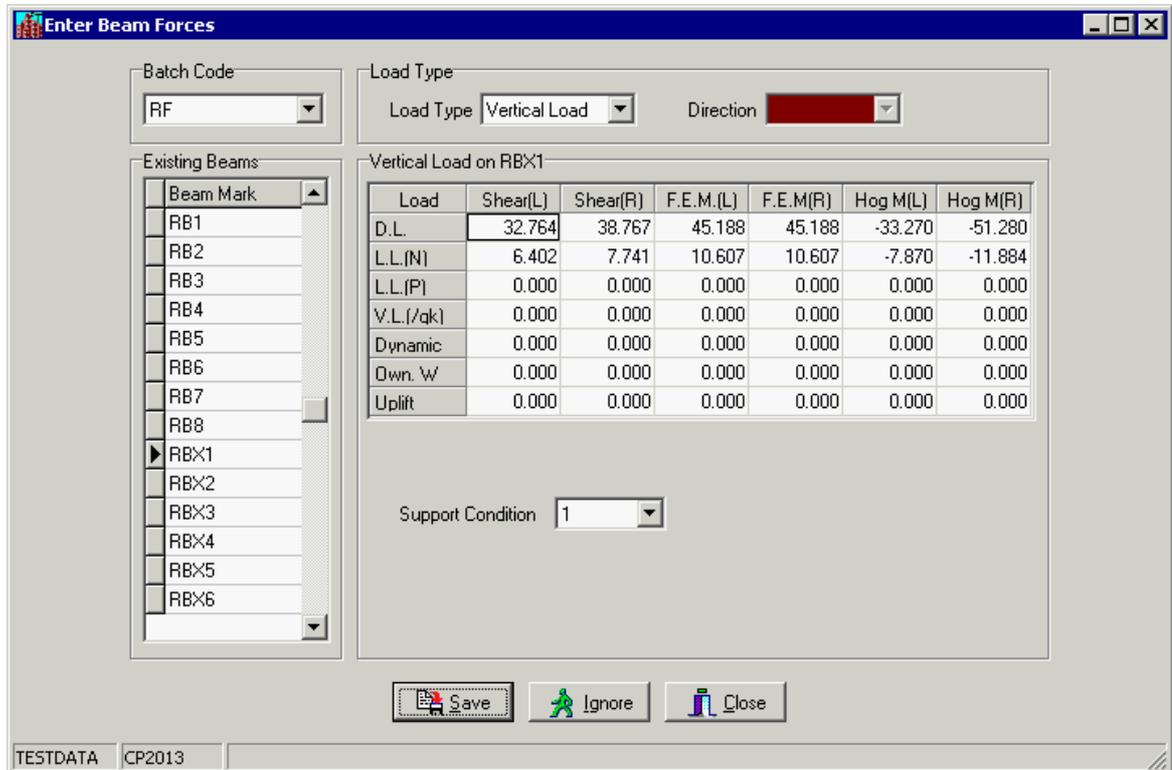
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 7.7 Enter Beam Forces Sub-command

### 7.7.1 Enter Beam Vertical Load

The Enter Beam Force Sub-command allows you to enter forces of beams manually. If you do not want to use the analysis result of **SADS** to calculate the beams forces, or if you wish to use some result of beams for any purposes, you may use this Sub-command to enter the vertical loads, wind moments, soil moments and dynamic moments of beams.

When you choose Enter Force from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Enter Beam Force as below.



**Enter Beam Forces**

Batch Code: RF

Load Type: Vertical Load    Direction: 

Existing Beams:

- RB1
- RB2
- RB3
- RB4
- RB5
- RB6
- RB7
- RB8
- RBX1**
- RBX2
- RBX3
- RBX4
- RBX5
- RBX6

Vertical Load on RBX1

Load	Shear(L)	Shear(R)	F.E.M.(L)	F.E.M.(R)	Hog M(L)	Hog M(R)
D.L.	32.764	38.767	45.188	45.188	-33.270	-51.280
L.L.(N)	6.402	7.741	10.607	10.607	-7.870	-11.884
L.L.(P)	0.000	0.000	0.000	0.000	0.000	0.000
V.L./qk	0.000	0.000	0.000	0.000	0.000	0.000
Dynamic	0.000	0.000	0.000	0.000	0.000	0.000
Own. W	0.000	0.000	0.000	0.000	0.000	0.000
Uplift	0.000	0.000	0.000	0.000	0.000	0.000

Support Condition: 1

Buttons: Save, Ignore, Close

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**Batch Code** - There are two parts of batch code, first part is named as "ALL", second part is the listing of the batch codes of the building. Refer to [Beam data sub-command](#). You can click the combo box to select the desired batch code or you may use [incremental search](#) to find the batch code.

**Existing Beam Mark** - The list box is the listing of the relevant beam marks of the selected batch code.

You may search the desired batch code and beam mark using [incremental search](#) described in How to use SADS topic.

#### Load Type Group Box :

**Load Type** - Select Vertical Load from combo box.

**Direction** - It is disabled when you select Vertical Load.

**Loads Group Box** : If you select the vertical load type, the loads group box is as above figure. The wind load, soil load and dynamic load will be explain on the next topic.

#### Column Title:

**Shear** - Indicates the shears of beam (in kN-M), the followed symbol (L) means left hand side, and (R) means right hand side.

**F.E.M.** - Indicates the fixed end moments of beam (in kN-M), the followed symbol (L) and (R) are same as above.

**Hog M** - Indicates the hogging moments at both ends of beam (in kN-M), the followed symbol (L) and (R) are same as above.

#### Row Title:

**D.L.** - Enter the dead load.

**L.L.** - Enter the live load.

**V.L./qk** - Enter the factor of vehicle load.

**Dynamic** - Enter the vertical dynamic load.

**Own weight** - Enter the own weight of beam and slab.

**Uplift** - Enter the uplift load.

**Support condition** - **SADS** define the support condition of beam into six different types, the followed figure shows you graphically about the support condition. Enter the number of support.

**0** -- single span simply supported beam.

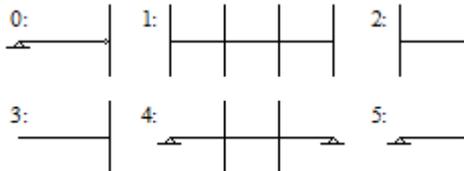
**1** -- multiple span continuous beam with two fixed end.

**2** -- single span continuous beam with two fixed end.

**3** -- cantilever beam.

**4** -- multiple span continuous beam with one fixed end and other hinged.

**5** -- single span continuous beam with one fixed end and other hinged.



You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 7.7.2 Enter Beam Lateral Load

If the load type you select is "wind load", "soil load" or "dynamic load", the Loads Group Box will be display as below.

Floor	M(LHS)	M(RHS)	V
UR/F	0.000	0.000	0.000
RF/F	0.000	0.000	0.000
13/F	0.000	0.000	0.000
12/F	27.489	-24.731	-8.921
11/F	28.679	-25.585	-9.234
10/F	29.714	-26.404	-9.491
09/F	31.675	-27.957	-10.074
08/F	33.291	-29.403	-10.498
07/F	33.674	-29.597	-10.533
06/F	33.671	-29.469	-10.458
05/F	35.178	-30.762	-10.918
04/F	35.006	-30.861	-10.779
03/F	32.273	-28.418	-9.913
02/F	34.979	-35.889	-12.354
01/F	0.000	0.000	0.000

### Load Type Group Box :

**Load Type** - Select Wind Load, Dynamic Load or Soil Load from combo box.

**Direction** - Select the direction of selected Lateral Load.

### Loads Group Box :

**M (LHS)** - Enter the left hand side bending moment of wind loads (in kN-M)..

**M (RHS)** - Enter the right hand side bending moment of wind loads (in kN-M).  
**V** - Enter the shear of beam (in kN).

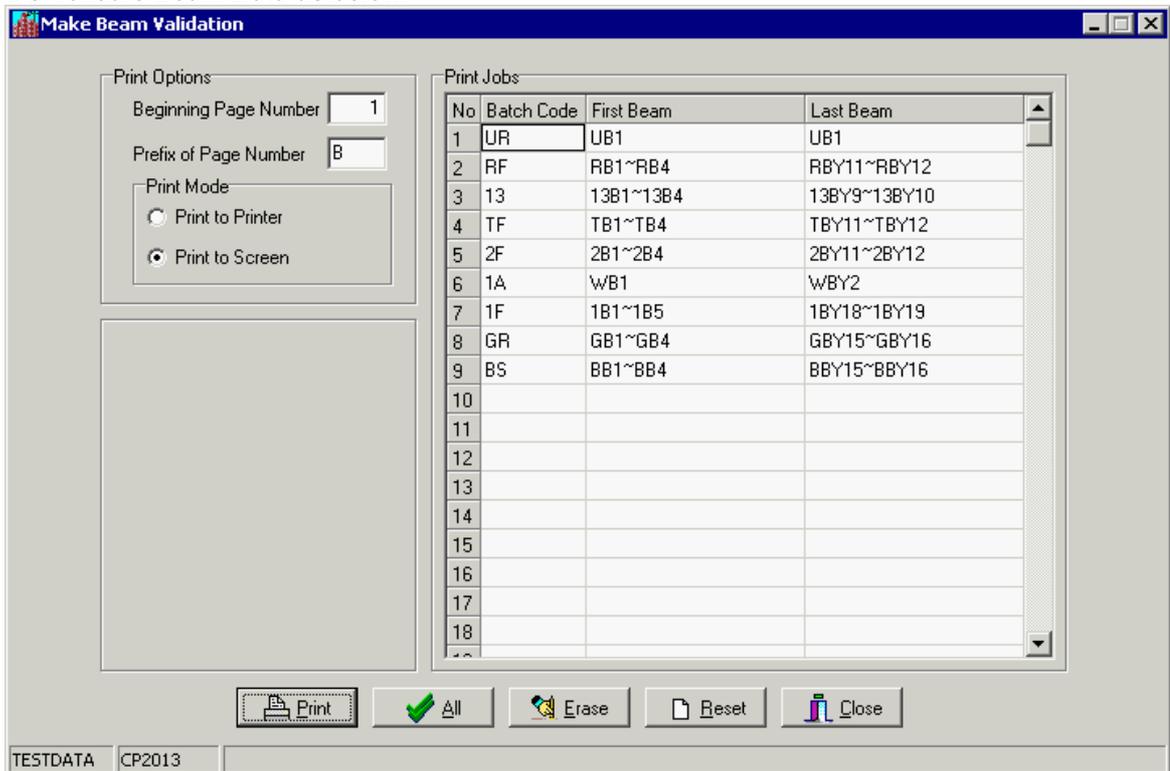
The column fields are the [floor code](#) of the building. Click the appropriate floor code of the selected beam mark and enter the value in each row.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 7.8 Validate Beam Data Sub-command

The Validate Beam Data Sub-command is use to make a validation about the beam data and batch data you provided. **SADS** will print out or display all the incorrect data after finish the procedure.

When you choose Beam Validation from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Validate Beam Data as below.



No	Batch Code	First Beam	Last Beam
1	UR	UB1	UB1
2	RF	RB1~RB4	RB11~RB12
3	13	13B1~13B4	13BY9~13BY10
4	TF	TB1~TB4	TBY11~TBY12
5	2F	2B1~2B4	2BY11~2BY12
6	1A	WB1	WBY2
7	1F	1B1~1B5	1BY18~1BY19
8	GR	GB1~GB4	GBY15~GBY16
9	BS	BB1~BB4	BBY15~BBY16
10			
11			
12			
13			
14			
15			
16			
17			
18			

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#) except the default page mark is "B".

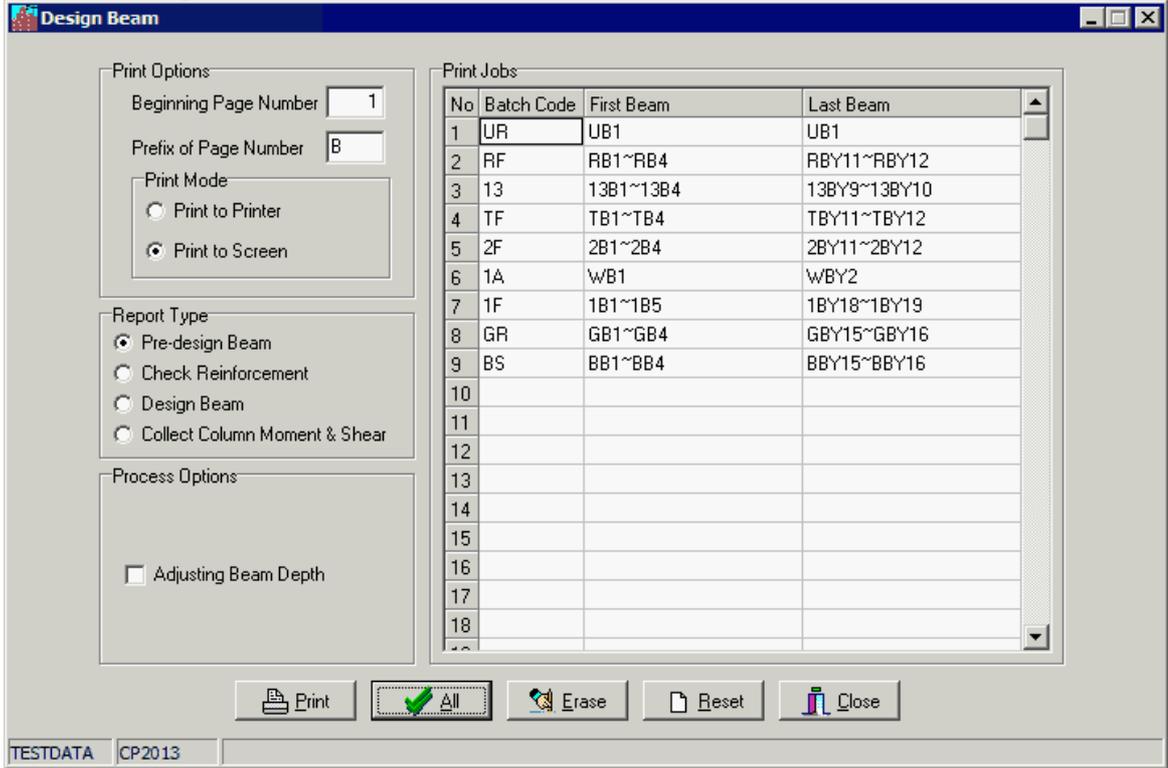
**Print Jobs Group Box:** Refer to the [Print Beam Reports Sub-command](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 7.9 Beam Design Sub-command

The Design Beam Sub-command enables you to pre-design, checking reinforcement and design the beams.

When you choose Beam Design from Beam command of the Module menu or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Beam Design as below.



No	Batch Code	First Beam	Last Beam
1	UR	UB1	UB1
2	RF	RB1~RB4	RB11~RB12
3	13	13B1~13B4	13BY9~13BY10
4	TF	TB1~TB4	TBY11~TBY12
5	2F	2B1~2B4	2BY11~2BY12
6	1A	WB1	WBY2
7	1F	1B1~1B5	1BY18~1BY19
8	GR	GB1~GB4	GBY15~GBY16
9	BS	BB1~BB4	BBY15~BBY16
10			
11			
12			
13			
14			
15			
16			
17			
18			

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#) except the default page mark is "B".

**Print Jobs Group Box:** Refer to the [Print Beam Reports Sub-command](#).

**Report Type Group Box:** Click the radio button and select the Pre-design Beam or Design Beam.

**Pre-design Beam** - Click the radio button if you want to pre-design the beams. SADS will perform the following jobs..

1. Checking the section of beam, whether is enough to against the support shears and bending moments. If it is over stress, SADS will print a report to remind you.
2. Finding the possible error which cannot be found in the [Validate Data Program](#), such as the endless circulation of beams, etc.
3. Calculating the support shears and F.E.M. of the beams.
4. Generate the bar sketch of beams if there is no error in pre-design process and Adjusting Bars / Stirrup Only check box is un-checked.

Before you run this sub-command, remember that you have done [pre-design of slabs](#) and [import the lateral forces](#). If there are errors in pre-design report, you must fix these errors and run pre-design sub-command again until no more error messages appear in the report. If not, the design sub-command cannot generate report for submission properly.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars of beam and don't want to alter the bar sketch that generated by pre-design option and edited by you. SADS will generate a report if some of beam sections are under designed. Before you run this option, you must make sure all beams have been pre-designed

before. If you check the Adjusting Bars / Stirrups check box, all under designed reinforced bars will be increased automatically.

**Design Beam** - Click the radio button to print out the calculation of beams in the building for the submission to B.D. Before you run this option, you must complete the pre-design of beam option to generate bar sketch and edit beam sketch using Edit Beam Sketch Sub-command if necessary.

**Collect Column & Joint Forces** - If you need to collect column and / or joint forces and don't want to alter the reinforcement of beam, you can select this option. According with the requirement of collecting column forces, this option requires all beams to processed without selection.

#### Process Options Group Box :

When you select Pre-design Beam, the Process Options Group Box has 1 check box.

**Adjusting beam depth** - If you want to adjust beam depth that do not meet the requirement of PNAP173, check this check box.

When you select Checking Reinforcement, the Process Options group box has 1 check box.

**Adjusting Bars / Stirrups** - If you want to adjust the reinforced bars, check the check box. Otherwise, **SADS** will perform checking only.

When you select Design Beam, the Process Options Group Box has 4 check boxes.

**Plot Loading Sketch** - Check the check box if you want to plot the loading sketch in beam design print out. otherwise do not check it.

**Print Detail of StIRRUP** - In the usual way, **SADS** prints the detail of stirrups at the three segments of one selected beam. If you want to print the detail of stirrups in eight segments for any purpose, check the check box.

**Plot Reinforce Bar Sketch** - Check the check box if you want to plot the reinforce bar sketch in beam design print out. otherwise do not check it.

**Print Lateral Load** - Check the check box to print the detail of lateral load in each span of beam.

**Print All States** - Check the check box to print more detail results for study or answer quest that raised by BD. You should not to print the results by this option for submitting your drawing.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

#### Useful Tips:

1. If you have changed your project data, e.g. slab, beam, column and ETABS data, the required areas of reinforcement are changed. If you have spent a lot time to edit the sketch of reinforced bars, you can select Checking Reinforcement option to generate a report. The report lists beam marks, required bar areas and provided bar areas that are under designed. You may make a decision how to fix the beam.
2. When you want to start the sub-command with Beam Design option and you are not sure whether your data have been changed or not, you can run this sub-command with Checking Reinforcement option. If no beam is listed as under designed beam, you can run this sub-command with Beam Design option without error.
3. If you see only minor changes of bar areas from report of Checking Reinforcement option, you can run the sub-command with Checking Reinforcement option and check the Adjusting Bars / Stirrups check box to change the number and / or diameter of longitudinal bars and the diameter, leg number and / or spacing of stirrups. But, the shape of bar sketch is un-changed.

## 7.10 Edit Beam Sketch Sub-command

### 7.10.1 Edit Beam Sketch

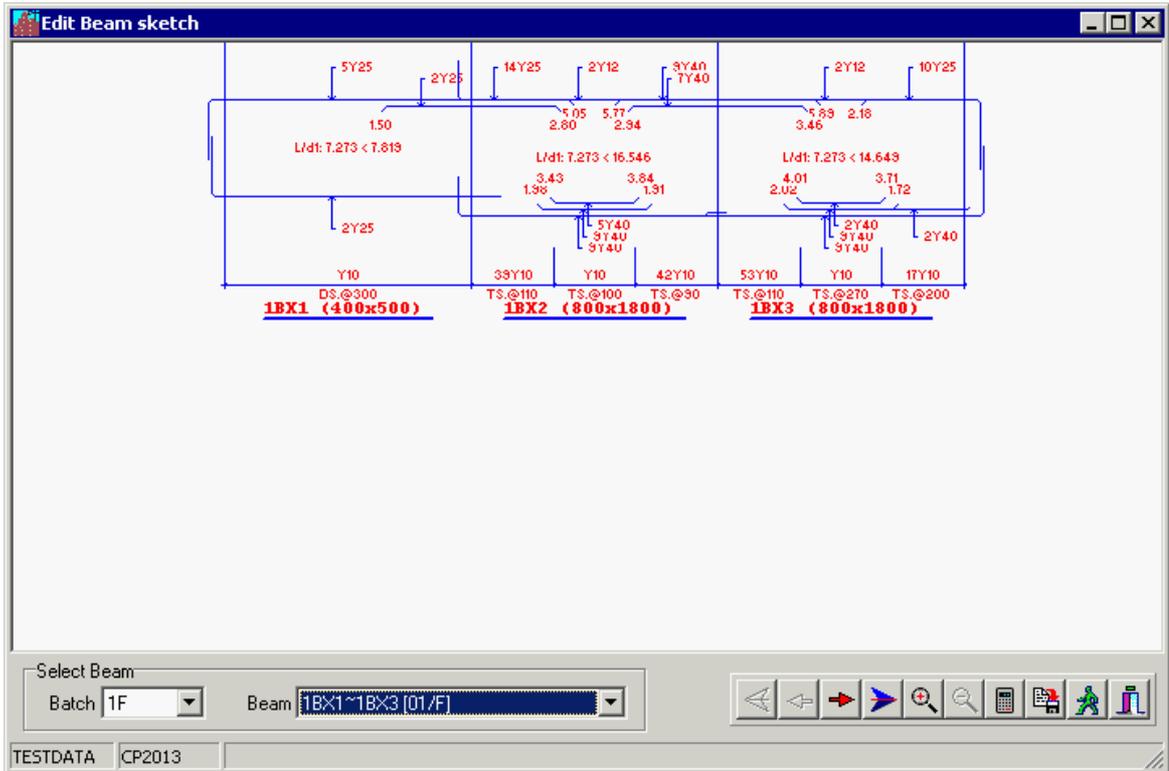
The Edit Beam Sketch Sub-command allows you to edit the bar sketch of the beams which have been generated by **SADS**.

When you choose Beam Sketch Edit from Beam command of the Module menu or click 

button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will

display the Edit Beam Sketch as below.

Edit Beam Sketch.



#### Select Beam Group Box :

**Batch Code** - Click the combo box to select the [batch code](#) of those beams which are going to be edit.

**Beams** - Click the combo box to select the beam marks in the [existing batch data](#).

You may search the desired batch code and beam mark using [incremental search](#) described in How to use **SADS** topic.

The display Graphic of this sub-command is generated by **SADS**, they include three portion.

- The first portion is the details and layout of longitudinal bars of the continuous beam.
- The second portion is the details of stirrups of the continuous beam.
- The third portion is the actual and allowable span effective depth ratio.

You may use bottom right buttons to perform different functions:



to display the first continuous beam in the batch.



to display the prior continuous beam of the selected beam.



to display the next continuous beam of the selected beam.



to display the last continuous beam in the batch.



to zoom in the sketch drawing for easy editing.



to zoom out the sketch drawing to last level.



to calculate new bar curtailment of reinforced bars.



to save the bar information that you changed.



to cancel the changes that you made.



to close the window.

If you want to edit the longitudinal bar, the stirrup or the layout of bar, You may move the mouse cursor to desired portion and click the mouse button to make the portion active. The displayed dialog box will be explain at following sections.

If the continuous beam contains too many spans and cannot be shown in the window area, you can move the mouse cursor to un-selected area and drag the sketch drawing up or down to make the invisible part to visible. Furthermore, you can resize the window to view more beams in the same viewable area.

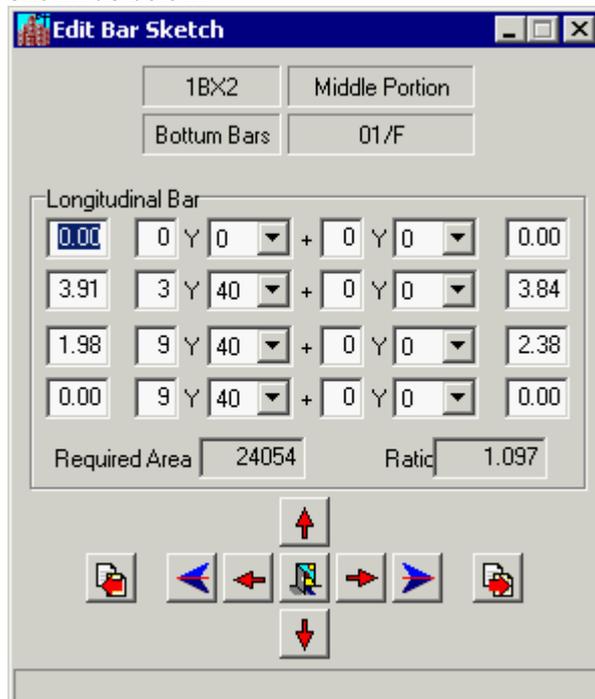
After you change the longitudinal bars, the curtailment of bars (the position of break points) may need to be changed, You can click the  button to do that.

## 7.10.2 Edit Longitudinal Bar

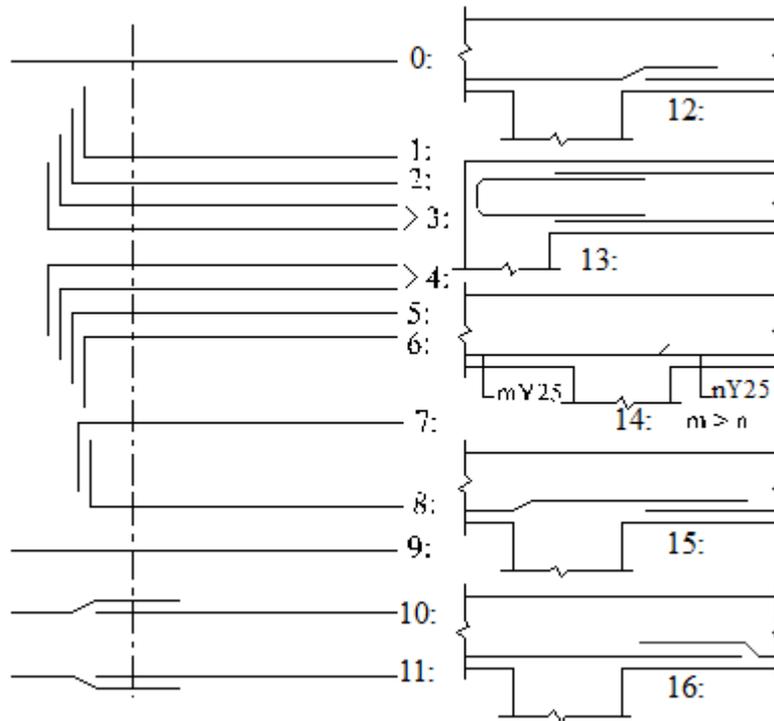
If you want to edit the longitudinal bar sketch, click the certain portion of longitudinal bar on [Edit Beam Sketch](#) .

The longitudinal bars of beam span are divided into 3 segments and 2 parts, the 3 segments are the left portion, the middle portion and the right portion. The 2 parts are upper part and lower part, and up to four layer in each part. The layer sequence of upper part is from top towards bottom and the layer sequence of lower part is from bottom to top.

For example, if you click the middle bottom portion of 1BX2, the longitudinal bar dialog box is shown as below.



Using this dialog box, you can edit the bar diameter, bar number, position of break and type of bar edge in each layers. **SADS** defined the types of bar into 16 kinds, the number is from 0 to 16, the followed diagram shows the types of bar edges.

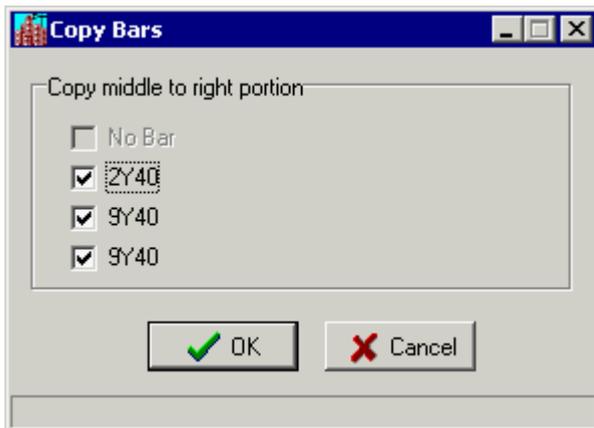


The outline of the bar that appears on the bottom boxes are the required area and the ratio. **Required area** is the value that calculated by **SADS**. **Ratio** is the ratio of provided area and required area. While you editing the reinforced bar, **SADS** will provide this ratio instantly. If the value is less than the allowance of bar area that defined in [Beam \(2\) page of Master Data Sub-command](#), **SADS** will give you a warning. If no value appears on the sketch, it means from calculation point, does not necessary to arrange the bar in this portion.

You may use the following navigator to change the position of bar portion:

-  to move to previous span of continuous beam.
-  to move to next span of continuous beam.
-  to move to left portion.
-  to move to right port portion.
-  to move to upper portion.
-  to move to lower portion.
-  to copy the reinforced bars from this portion to right portion.
-  to copy the reinforced bars from this portion to left portion.
-  to exit the window.

If you click the  button or  button, a dialog box will be displayed as below.

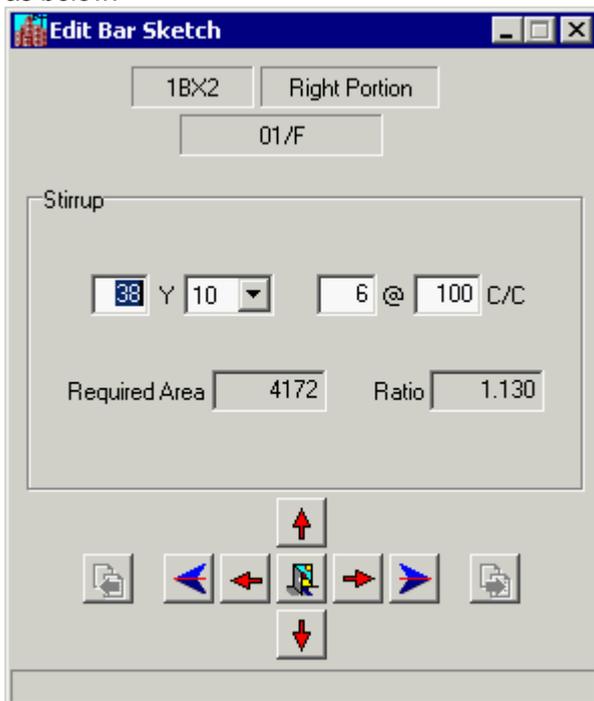


If there are multiple layers of reinforced bars, you can determine which layers you want to copy. After you checked the desired check boxes, you may click the OK button to perform copy function. You can click the Cancel button to deny the copy function.

### 7.10.3 Edit Stirrup Bar

If you want to edit the stirrup bar, click the certain part of stirrup bar on [Edit Beam Sketch](#). The stirrup bars are divided in to 3 portions, left portion, middle portion and right portion.

For example, if you click the middle portion stirrups of RB3, the edit stirrups dialog box is shown as below.



Using this dialog box, you can edit stirrup diameter, leg number, spacing of stirrups and the number of stirrups.

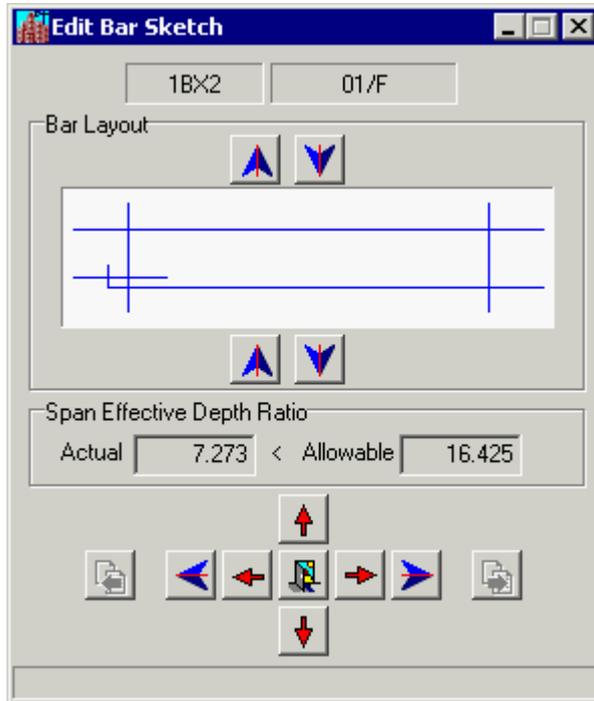
The bottom box **Required area** is the value that calculated by **SADS**. **Ratio** is the ratio of provided area and required area. While you editing the stirrups, **SADS** will provide this ratio instantly. If the value is less than the allowance of bar area that defined in [Beam \(2\) page of Master Data Sub-command](#), **SADS** will give you a warning at the "Ratio" box.

You may use the [navigator](#) to move the active portion.

### 7.10.4 Edit Bar Layout

If you want to edit the layout of longitudinal bar, click a point between top bar line and bottom bar line on [Edit Beam Sketch](#).

For example, if you click any point between top line and bottom line in RB3, the bar layout dialog box is shown as below.



**Bar Layout Group box:** You may click  or  at the top portion of this group box to move the top longitudinal bar up or down. To move the bottom longitudinal bar, you can click the same buttons at bottom portion of this group box.

**Span Effective Depth Ratio Group box:** The values that appear in the box is calculated by **SADS**. Usually the actual value should be less than the allowable value.

If the actual value is larger than allowable value, you should edit the longitudinal bar sketch or edit the beam section on [Maintain Beam Data Sub-command](#).

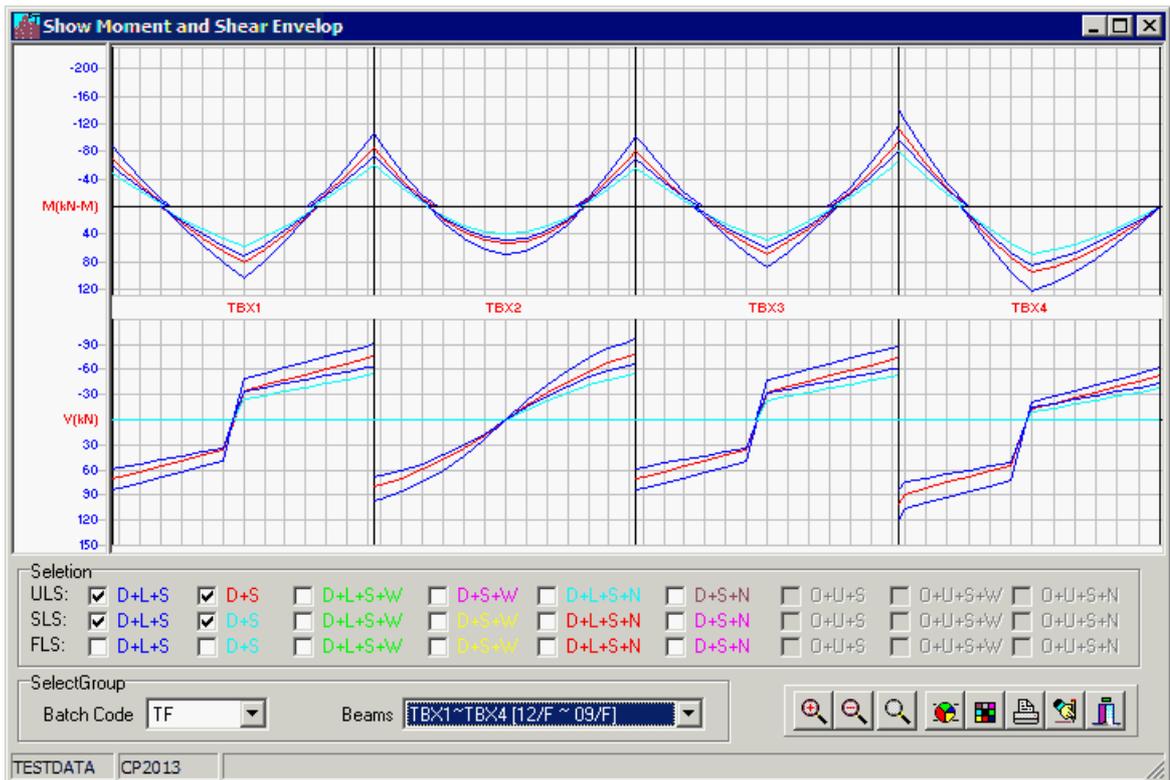
You may use the [navigator](#) to move the active portion.

## 7.11 Moment and Shear Envelope Sub-command

The Moment and Shear Envelope Sub-command is use to display and print the moment and shear envelope curves of beams for your reference only.

When you choose Moment and Shear Envelope from Beam command of the Module menu or

click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Moment and Shear Envelope as below.



The display Graphic of this sub-command include two portion.

The upper rectangular portion shows the envelope curves of bending moments of the continuous beam, the value that appear on the left sides denote the value of bending moments(in KN-M).

The lower rectangular portion shows the envelope curves of shears of the continuous beam, the value that appear on the left sides denote the value of shears(in KN).

**Selection Group Box :** This is the legend of loading cases, there are some difference check boxes, each box denote the difference loading case, the symbols that appear at those boxes are: "D" is dead load, "L" is life load, "U" is up lift, "O" is own weight, "W" is wind load, "S" is soil load and "N" is dynamic load. You may check the check box for your selection.

#### Select Beam Group Box :

**Batch Code** - Click the combo box to select the [batch code](#) of those beams you want.

**Beams** - Click the combo box to select the beam marks in the [existing batch data](#).

You may search the desired batch code and beam mark using [incremental search](#) described in How to use **SADS** topic.

**Functional button :** You may click the following buttons:



to zoom in the envelop to next level;



to zoom out the envelop back to previous level;



to zoom the envelop to original size;



to display envelop option dialog box;



to change the colors of lines in envelop;



to print the envelop in text format;



to plot the envelop graphically. You can zoom in / zoom out the moment and shear

envelop in new pop-up window. If you satisfy this drawing, you can click the Print button  to plot the envelop curves..



to exist the window.

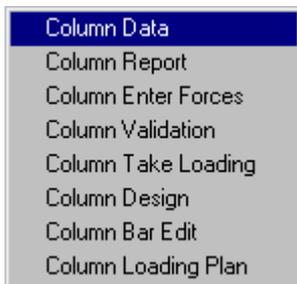
After you zoom in the envelop, the window cannot show all part of envelop. You can drag the envelop to left or right to make the invisible part to visible.

## 8 Column Command

### 8.1 About Column Command

In the Column Command, you can supply the data of column, validate the column data, pre-design column section, edit reinforced bar, calculate column reinforced bar and drawing column sketch.

When you choose Column from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the column sub-command buttons are display as below.



The Sub-commands are:

1. Maintain Column Data Sub-command.
2. Print Column Reports Sub-command.
3. Enter Column Forces Sub-command
4. Validate Column Data Sub-command.
5. Take Column Sub-command.
6. Design Column Sub-command.
7. Edit Column Bar Sub-command.
8. Column Loading Plan Sub-command.

### 8.2 Maintain Column Data Sub-command

The Column Data sub-command is use to create a new column data or edit an existing column data of the building.

When you choose Column Data from Column Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Maintain Column Data as below.

**Maintain Column Data**

Existing Columns: C1, C2, C3, C4, C5, **C6**, C7, C8, C9, C10, C11, C12, C13, C14, C15

Header Data:  
 Column Mark: C6 X: 18.000  
 Angle: 0.0 Y: 6.000  
 Footing:  Hinge  Fixed  
 Transfer plate connection  
 Auto Generate  
 Bracing:  Braced in X-X  Braced in Y-Y

Floor	B(mm)	D(mm)	Hx(M)	Hy(M)	R.F.	Fix	Ext	Check
09/F	500	500	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	N
08/F	500	500	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	S
07/F	500	500	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	N
06/F	500	500	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	S
05/F	550	550	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	N
04/F	550	550	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	N
03/F	550	550	3.200	3.200	40	<input type="checkbox"/>	<input type="checkbox"/>	S
02/F	550	550	4.000	4.000	40	<input type="checkbox"/>	<input type="checkbox"/>	S
01/F	650	650	5.000	5.000	40	<input type="checkbox"/>	<input type="checkbox"/>	S
GR/F	650	650	3.500	3.500	40	<input type="checkbox"/>	<input type="checkbox"/>	S
RS/F	650	650	1.800	1.800	40	<input type="checkbox"/>	<input type="checkbox"/>	S

#	Beam Mark	Flag	Angle	Eccentric	Auto
1	GBX6	R	180.0	N	<input checked="" type="checkbox"/>
2	GBX7	L	0.0	N	<input checked="" type="checkbox"/>
3	GBY11	R	270.0	N	<input checked="" type="checkbox"/>
4	GBY12	L	90.0	N	<input checked="" type="checkbox"/>
5	N	R	0.0	N	<input type="checkbox"/>
6	N	L	0.0	N	<input type="checkbox"/>
7	N	R	0.0	N	<input type="checkbox"/>
8	N	L	0.0	N	<input type="checkbox"/>
9	N	L	0.0	N	<input type="checkbox"/>
10	N	L	0.0	N	<input type="checkbox"/>

Vehicular Load Info on GR/F:  
 Load Class: 6B Loaded Length: 12.000 Distributed qk: 6.014

Buttons: Add, Insert, Delete, Copy, Save, Ignore, Close

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**Existing Column Mark Group Box :** The list box is the listing of the existing column marks which have previously created. You may search the desired column mark using [incremental search](#)

described in How to use **SADS** topic. There is a  button under the box, so you can rearrange the order of the existing column data using [re-arrange marks](#) in How to use **SADS** topic.

#### Header Data :

**Column Mark** - Enter the alpha numerical up to 8 characters long for the column mark.

**Angle** - The inclined angle between B side of column and global X axis. If the column data is generated by [Generate SADS Data Sub-command](#), the angle is taken from ETABS data.

**X,Y** - Enter the X and Y global coordinates of center of column.

**Footing** - Click the radio button to define the footing of column is hinge or fixed. If you select hinge connection, the column height at the lowest floor will be deducted by 0.75 when calculating effective height of column and distributing un-balance moments of beams.

**Transfer plate Connection** - If the column is connected to transfer plate at the highest end, check the check box. Otherwise, un-check the check box.

**Auto Generate** : If the column data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input column data manually, you don't check this check box.

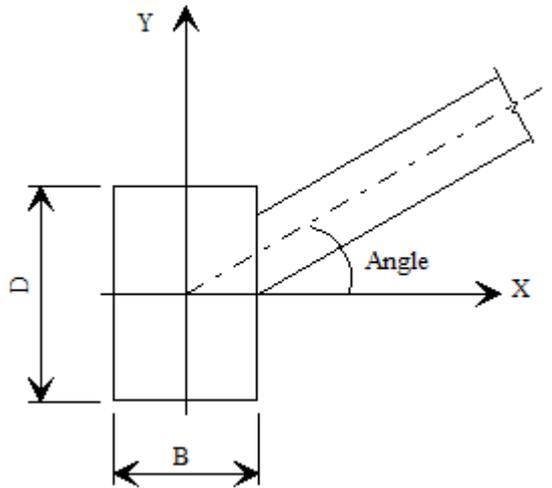
**Bracing** - Check these check box to define braced column. This option is available when selecting "Define by input data" option in Column Page of Master Data.

#### Column Data Group Box :

**Floor** - The listing of the [floor code](#) that you previously defined in Floor Data Sub-command.

**B(mm)** - Enter the dimension of column section in X-X direction (in mm), if B = 0, indicates the column does not exist at the space between this floor and the lower floor.

**D(mm)** - Enter the dimension of column section in Y-Y direction (in mm), if D = 0, indicates the column section is circular.



**Hx(M)** - Enter the value of the column height in X-X direction (in M), **SADS** retrieves the value from the Floor Data Sub-command, if you want to modified the default value for any reason, type the value in the corresponding field.

**Hy(M)** - Enter the value of the column height in Y-Y direction (in M).

**R.F.** - Click the edit box and enter the value of the reduction percentage (in %) of the applied live load. According Clause 3.7.1(c), the vehicle load should not be deducted. **SADS** can detect this kind of load and skip the reduction process automatically.

**Fix** - If the check box is checked, the live load reduction percentage of this floor is fixed when accumulating this live load to all lower floors, otherwise, when accumulate the live load of this floor to the lower floors, the reduction percentage of lower floors will be used.

**Ext** - If a column has no connected beam and slab in a specific floor, you need to check this check box to define the column under this floor is an extension column. The extension column will attached to the regular column above it.

**Check** - Click the Combo box and select the following options. It is the way to check the reinforced bar of column.

"U" -- To check the reinforcement in optimal way. **SADS** will arrange the reinforced bars according to the optimization method.

"S" -- To check the reinforcement in uniform way. **SADS** will arrange the reinforced bars uniformly through the edge of column section.

"E" -- To check the reinforcement in equal way. **SADS** will arrange the reinforced bars of B side equal to D side.

"C" -- To check the column as circular section.

"N" -- Do not need to check the reinforcement on this floor.

If there is alternative floor under the selected floor, you can click the Insert button  to add a column under alternative floor. You highlight a column under alternative floor, you can click the

Delete button  to delete this column under this alternative floor.

**Connected Beams Group Box** : Indicate the number of beam, corbel or H.A. loading which connected around the column. **SADS** provides the maximum up to 8 items in each floor connected to the column. You should define the order of the connected substance, this order should always be the same at each floor in the same column. The followed figure shows you graphically about the order of the connected substances in a column.

The information of this group box are:

**Beam Mark** - Enter the beam marks which connected to the column. If it is a corbel connected, enter the corbel mark. If it is a H.A loading, enter the value (in KN) in the appropriate edit box. If it is information of end condition of column, enter end condition number taken from Table 6.11 and 6.12 in Clause 6.2.1.1(e) of CoP 2013.

**Flag** - Click the combo box and select the following options.

"L" -- Select "L", if the Left end of beam is connected to column.©

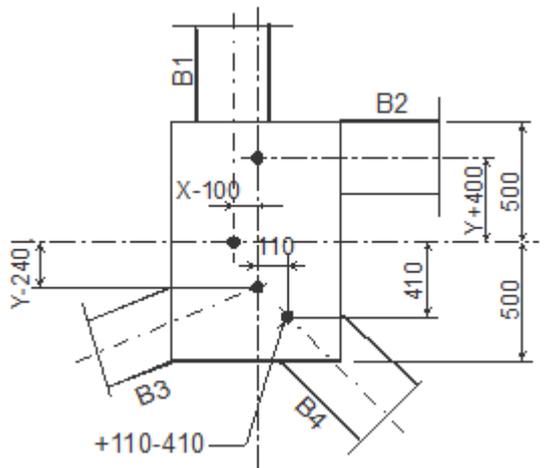
"R" -- Select "R", if the Right end of beam is connected to column.

"C" -- Select "C", if corbel is attached to column.

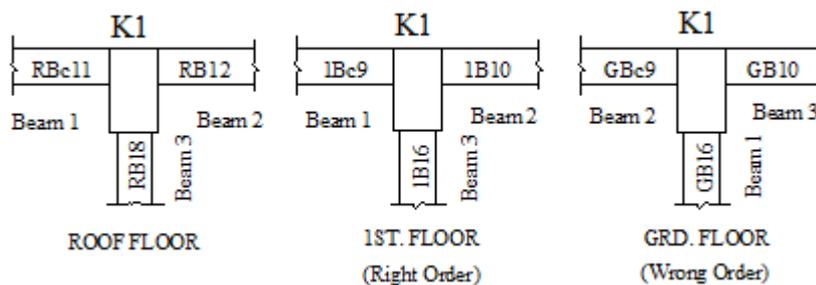
- "H" -- Select "H", if it is the value of H.A. loading.
- "X": -- Select "X", if the end condition apply to X direction only.
- "Y": -- Select "Y", if the end condition apply to Y direction only.
- "B": -- Select "B", if the end condition apply to both directions.

**Angle** - Indicates the angle from X-axis (Width side) of column to the axis of beam or corbel. The followed figure shows you graphically about this angle. The valid value is from 0 degree to 360 degrees. Enter the value (in degree) of each beam or corbel, if it is H.A. loading, enter "0". Please see the following example.

**Eccentric** - If the load center of connected beam is sitting on the center of column section, enter "N" to this field. Otherwise, you must enter the location of load center to this field. There are 2 method to define the load center. The first method is looking for the location of the first intersection point of beam center line and column section center line, e.g. beam B1, B2 and B3. You can enter the "X" or "Y" plus "+" or "-" plus the value of eccentricity to the field, i.e. X-100, Y+400 and Y-240. The second method is used for connected beam in diagonal direction only and you can define the location of load center by yourself, e.g. beam B4. You can enter "+" or "-" plus the value of eccentricity in X-X direction plus "+" or "-" plus the value of eccentricity in Y-Y direction to this field, i.e. +110-410.



**Auto** - If the connected beam is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input connected beam or other load manually, you don't check this check box.



If you want to copy the column data and the connected beams from upper floor to the lower floor, highlight any field of the desired floor then click  button, SADS will copy all information from upper floor to this floor.

**Vehicular Load Info on XXXX Group Box:**

**Load Class** - There are 5 options you can select.

- N/A
- 6B
- 6D
- 6C
- 6E

If you select the N/A option, the loaded length and distributed qk data are not necessary.

These 2 edit boxes are disabled. Otherwise, you need to provide the following data.

**Loaded Length** - Enter the data according the appendix B item #9 of CoP 2011.

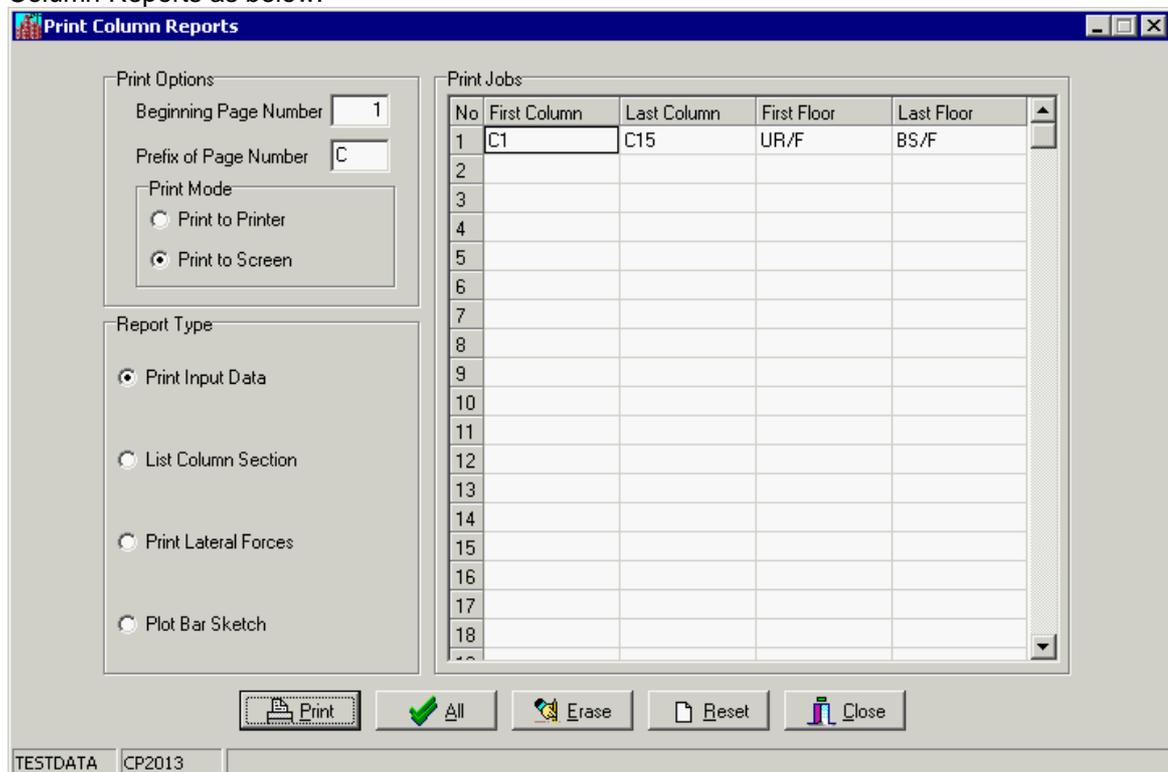
**Distributed qk** - For Class 6B to 6D, the data is calculated according with formulas in Appendix C of taken from Table 3.6 of CoP 2011. For Class 6E, this data is calculated using formulas in Clause 2.10.1 of SDM.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 8.3 Print Column Report Sub-command

The Print Column Reports Sub-command allows you to print out or display the existing column data, column section, the bending moments and axial forces of columns that produce from lateral load or the sketch of column for checking or other purposes.

When you choose Column Reports from Column Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Print Column Reports as below.



No	First Column	Last Column	First Floor	Last Floor
1	C1	C15	UR/F	BS/F
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "C".

#### Print Jobs Group Box:

**First Column** - Click the combo box to select the beginning column mark which going to be reported.

**Last Column** - Click the combo box to select the last column mark which going to be reported.

**First Floor** - Click the combo box to select the top [floor code](#) of the selected column.

**Last Floor** - Click the combo box to select the last [floor code](#) of the selected column.

You may use [incremental search](#) to select the desired column marks and floor codes.

If the "Report Type" is lateral load, the third and fourth fields are:

**Load Type** - Click the combo box to select wind load, soil load or dynamic load you want to

print.

**Direction** - Click the combo box to select the direction of lateral load: X-X or Y-Y.

**Report Type Group Box:** Click the radio button and select the subject you want. There are 4 subjects:

**Print Input Data** - print or display the column for your checking.

**List Column Section** - print or display the section of columns for the reference to architects.

**Print Lateral Load** - print or display the moment and shear produced by lateral load for your checking.

**Plot Bar Sketch** - plot or display the bar sketch of column for your reference or for the checking purpose.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

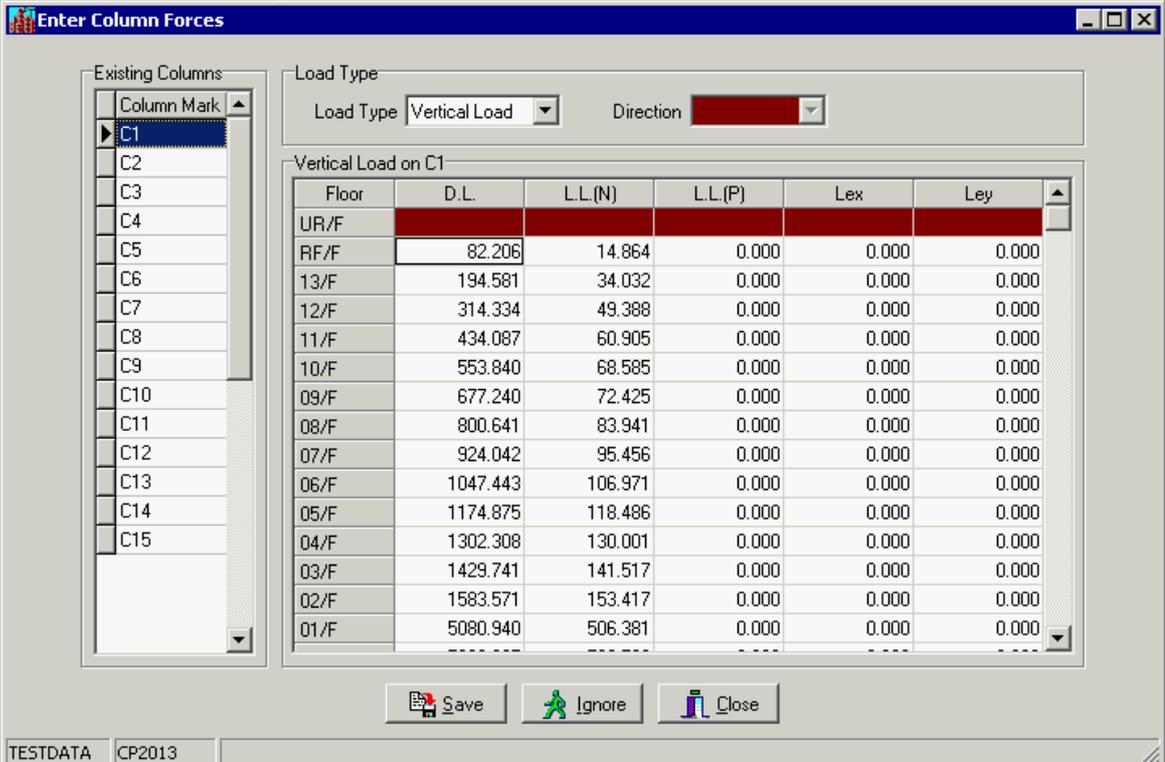
## 8.4 Enter Column Forces Sub-command

### 8.4.1 Enter Column Vertical Load

The Enter Column Force Sub-command enables you to enter the vertical loads, un-balance moments, wind loads or soil loads of the selected column manually. If you do not want to use the analysis result calculated by **SADS** for any reason, **SADS** provides this Sub-command for your convenience.

When you choose Column Enter Forces from Column Command or click  button on

[Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Enter Column Forces figure as below.



Floor	D.L.	L.L.(N)	L.L.(P)	Lex	Ley
UR/F				0.000	0.000
RF/F	82.206	14.864	0.000	0.000	0.000
13/F	194.581	34.032	0.000	0.000	0.000
12/F	314.334	49.388	0.000	0.000	0.000
11/F	434.087	60.905	0.000	0.000	0.000
10/F	553.840	68.585	0.000	0.000	0.000
09/F	677.240	72.425	0.000	0.000	0.000
08/F	800.641	83.941	0.000	0.000	0.000
07/F	924.042	95.456	0.000	0.000	0.000
06/F	1047.443	106.971	0.000	0.000	0.000
05/F	1174.875	118.486	0.000	0.000	0.000
04/F	1302.308	130.001	0.000	0.000	0.000
03/F	1429.741	141.517	0.000	0.000	0.000
02/F	1583.571	153.417	0.000	0.000	0.000
01/F	5080.940	506.381	0.000	0.000	0.000

**Existing Column Mark** - The list box is the listing of the existing column marks.

You may search the desired column mark using [incremental search](#) described in How to use **SADS** topic.

**Load Type Group Box :**

**Load Type** - Select Vertical Load from combo box.

**Direction** - It is disabled when you select Vertical Load.

**Loads Group Box :**

**D.L.** - Enter the accumulated dead load (in kN) which applied to the selected column in corresponding floor.

**L.L.(N)** - Enter the accumulated non-permanent live load (in kN) which applied to the selected column in corresponding floor.

**L.L.(P)** - Enter the accumulated permanent live load (in kN) which applied to the selected column in corresponding floor.

**Lex** - Enter the effective high of column in x-x direction (in M).

**Ley** - Enter the effective high of column in y-y direction (in M).

## 8.4.2 Enter Column Un-balance Moment

If the load type you select on the Enter Forces sub-command is un-balance moment for D.L., LL(N) or LL(P), the Loads Group Box will be display as below.

Existing Columns

Column Mark

Load Type

Load Type: Moment D.L. Direction: [disabled]

Bending Moment D.L. on C1

Floor	+Mtx	-Mtx	+Mty	-Mty	+Mbx	-Mbx	+Mby	-Mby
UR/F								
RF/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
09/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
08/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
07/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
06/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
05/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
04/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
03/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
02/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
01/F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Save Ignore Close

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**Load Type Group Box :**

**Load Type** - Select Moment D.L., Moment LL(N) or Moment LL(P) from combo box.

**Direction** - It is disabled when you select these load type.

**Loads Group Box :**

**Mtx** - Enter the value of the bending moments of dead loads or live loads at top level of column along B side. The symbol (+) means clockwise, (-) means anti clockwise.

**Mty** - Enter the value of the bending moments of dead loads or live loads at top level of column along D side. The symbol (+) means clockwise, (-) means anti clockwise.

**Mbx** - Enter the value of the bending moments of dead loads or live loads at bottom level of column along B side. The symbol (+) means clockwise, (-) means anti clockwise.

**Mby** - Enter the value of the bending moments of dead loads or live loads at bottom level of column along D side. The symbol (+) means clockwise, (-) means anti clockwise.

### 8.4.3 Enter Column Additional Load

If the load type you select on the Enter Forces sub-command is Additional (D.L. or L.L.), the Loads Group Box will be display as below.

The screenshot shows the 'Enter Column Forces' dialog box. The 'Load Type' is set to 'Additional D.L.' and 'Direction' is disabled. The 'Existing Columns' list shows 'C1' selected. The 'Additional D.L. on C1' table shows zero values for all load parameters across floors 01/F to UR/F.

Floor	Mark	P	+Mx	-Mx	+My	-My
UR/F						
RF/F		0.000	0.000	0.000	0.000	0.000
13/F		0.000	0.000	0.000	0.000	0.000
12/F		0.000	0.000	0.000	0.000	0.000
11/F		0.000	0.000	0.000	0.000	0.000
10/F		0.000	0.000	0.000	0.000	0.000
09/F		0.000	0.000	0.000	0.000	0.000
08/F		0.000	0.000	0.000	0.000	0.000
07/F		0.000	0.000	0.000	0.000	0.000
06/F		0.000	0.000	0.000	0.000	0.000
05/F		0.000	0.000	0.000	0.000	0.000
04/F		0.000	0.000	0.000	0.000	0.000
03/F		0.000	0.000	0.000	0.000	0.000
02/F		0.000	0.000	0.000	0.000	0.000
01/F		0.000	0.000	0.000	0.000	0.000

#### Load Type Group Box :

**Load Type** - Select Additional D.L., Additional LL(N) or Additional LL(P) from combo box.

**Direction** - It is disabled when you select these load type.

#### Loads Group Box :

**Mark** - Enter the mark of additional load for printing in column design report.

**P** - Enter the additional axial load (in kN).

**Mx** - Enter the additional bending moment in X-X direction (in kN-M). The symbol (+) means clockwise, (-) means anti clockwise.

**My** - Enter the additional bending moment in Y-Y direction (in kN-M). The symbol (+) means clockwise, (-) means anti clockwise.

### 8.4.4 Enter Column Lateral Load

If the load type you select on the Enter Forces sub-command is "wind load" or "soil load" or "dynamic load", the Loads Group Box will be display as below.

Floor	Mtx	Mty	Mbx	Mby	Vx	Vy	P
UR/F							
RF/F	-21.801	0.458	19.437	0.476	14.996	0.006	-8.715
13/F	-12.882	1.039	17.946	-0.051	11.210	-0.397	-20.009
12/F	-14.659	1.328	18.480	-0.547	12.050	-0.682	-31.325
11/F	-15.472	2.378	19.934	-1.611	12.875	-1.450	-42.558
10/F	-15.786	3.063	18.531	-2.445	12.479	-2.003	-53.692
09/F	-19.190	4.487	22.985	-3.756	15.336	-2.997	-64.979
08/F	-17.492	5.103	23.130	-4.937	14.772	-3.651	-76.370
07/F	-17.788	5.714	24.375	-5.911	15.332	-4.227	-87.325
06/F	-16.938	5.729	23.678	-6.725	14.769	-4.529	-98.007
05/F	-19.382	7.084	27.355	-8.198	16.995	-5.557	-108.694
04/F	-15.890	6.268	30.480	-9.189	16.862	-5.621	-119.260
03/F	-12.644	5.604	10.017	-4.906	8.240	-3.822	-128.756
02/F	-22.043	6.451	112.668	-34.487	37.947	-11.532	-138.856
01/F	-153.304	45.638	160.889	-57.426	98.185	-32.208	-306.384

#### Load Type Group Box :

**Load Type** - Select Wind Load, Dynamic Load or Soil Load from combo box.

**Direction** - Select the direction of selected Lateral Load.

#### Loads Group Box :

**Mtx** - Enter the value of the bending moments (in kN-M) at top level of column along B side.

**Mty** - Enter the value of the bending moments (in kN-M) at top level of column along D side.

**Mbx** - Enter the bending moments (in kN-M) at bottom level of column along B side.

**Mby** - Enter the bending moments (in kN-M) at bottom level of column along D side.

**Vx** - Indicates the shear of column (in kN) along B side. Enter the value in it.

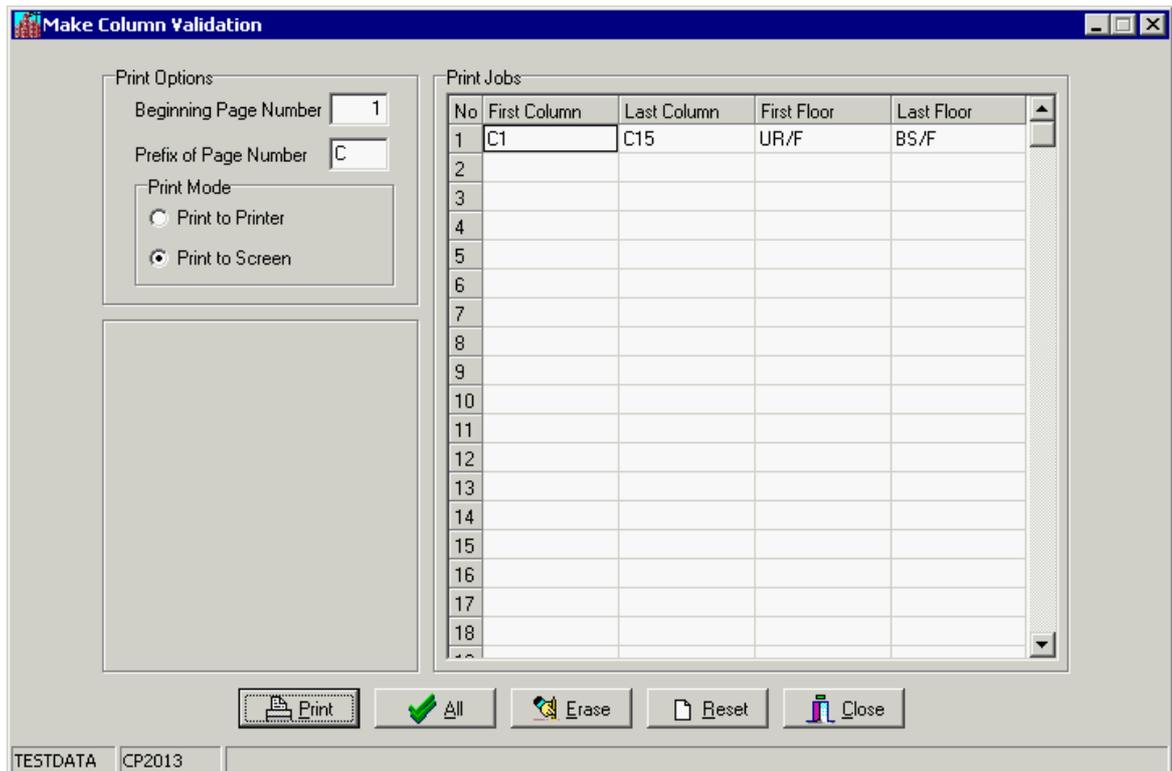
**Vy** - Indicates the shear of column (in kN) along D side. Enter the value in it.

**P** - Enter the axial force due to the wind load.

## 8.5 Validate Column Data Sub-command

The Validate Column Data Sub-command is use to make a validation about the column data you provided. **SADS** will print out or display all the incorrect data after finish the procedure.

When you choose Column Validation from Column Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Validate Column Data as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "C".

**Print Jobs Group Box:** Refer to [Print Column Report Sub-command](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 8.6 Take Column Loding Sub-command

The Take Column Loading Sub-command is use to collect the vertical loads of the columns (i.e., dead load and live load) which applied to each structural floor and accumulated from the top floor progress in sequence towards to the bottom floor. Besides, **SADS** will offer calculation report of the columns loading for the submission to B.D.. Before you run this Sub-command, make sure that you have already pre-design the beam.

When you choose Column Take Loading from Column Command or click  button on

[Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Take Column Loading as below.

No	First Column	Last Column
1	C1	C15
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "CL".

**Print Jobs Group Box:**

**First Column** - Use the combo box to select the beginning column mark which going to be taken the loading.

**Last Column** - Use the combo box to select the last column mark which going to be taken the loading.

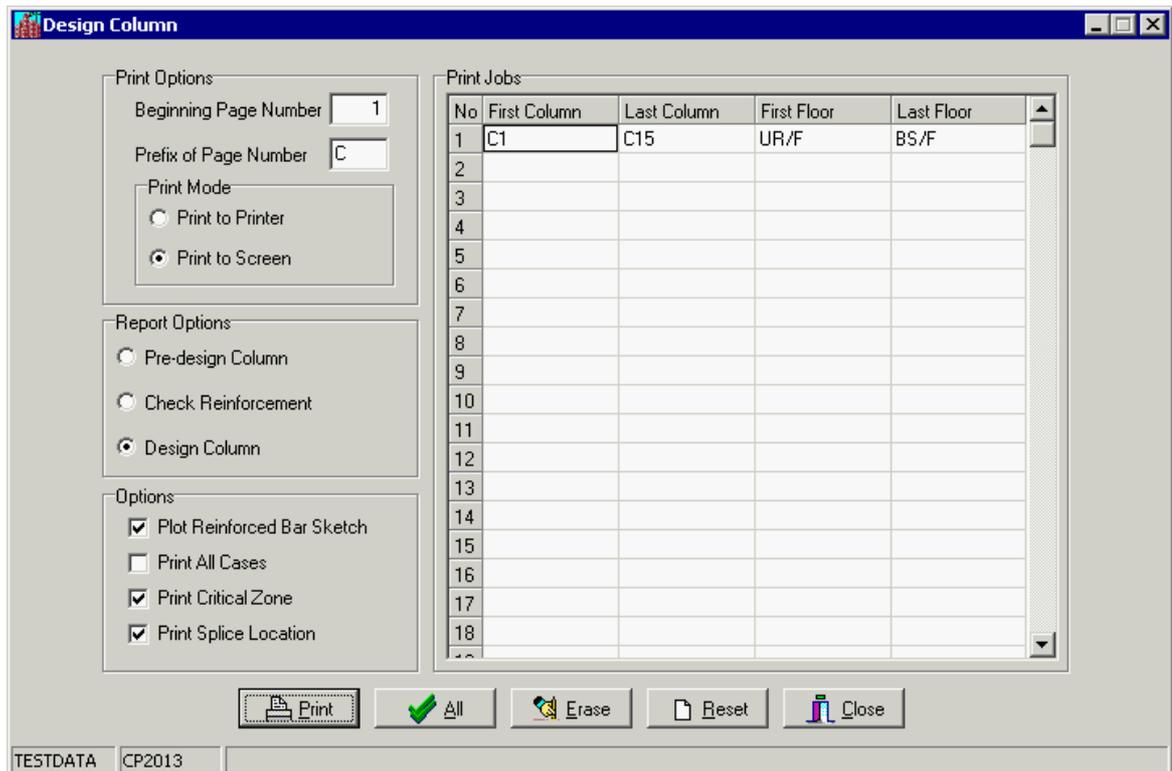
**Report Option Group Box:** Click the combo box and select the [floor code](#) you want to start for printing.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 8.7 Design Column Sub-command

The Column Design Sub-command enables you to Pre-design and design the columns.

When you choose Design Column from Column Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Design Column as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "C".

**Print Jobs Group Box:** Refer to [Print Column Report Sub-command](#).

**Report Type Group Box:** Click the radio button and select Pre-design column or Design Column.

**Pre-design Column** - Click the radio button if you want to Pre-design the column. It enables you to checking the column section whether it is enough to against the bending moments and axial forces, calculate the reinforced bar area of the column in each floor, provide the diameter and number of reinforced bar according to the result of calculation. At the same time, **SADS** will print a report about the area, number and diameter of reinforced bar, if the reinforced ratio is over the maximum value, **SADS** will give a value of "###" to remind you. You may then use the report to modify column data which are not enough. Before you wish to execute this program, you should take column loading.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars without alter the sketch of column sketch. **SADS** will generate a report if some of column sections are under designed. Before you run this option, you must complete the Pre-design of columns. If you check the Adjusting Reinforcement check box, all under designed reinforced bars will be increased automatically.

**Design Column** - Click the radio button to print out the calculation of walls in the building for the submission to B.D. Before you run this option, you must complete the Pre-design of columns and edit the sketch of columns.

#### Options Group Box:

When you click the Check Reinforcement button, the Option Group Box has one check box only.

**Adjust Reinforcement** - Check this check box if you want to adjust the under designed reinforced bars automatically.

When you click the Design button the Options Group Box will display the following option.

**Plot Reinforce Bar Sketch** - Check the check box if you want to plot the reinforce bar sketch in column design print out. otherwise do not check it.

**Print All Cases** - Check the check box if you want to print the calculation results for all loading cases.

**Print Critical Zone** - Check the check box if you want to include the calculation of the

length of critical zone and the links in the zone.

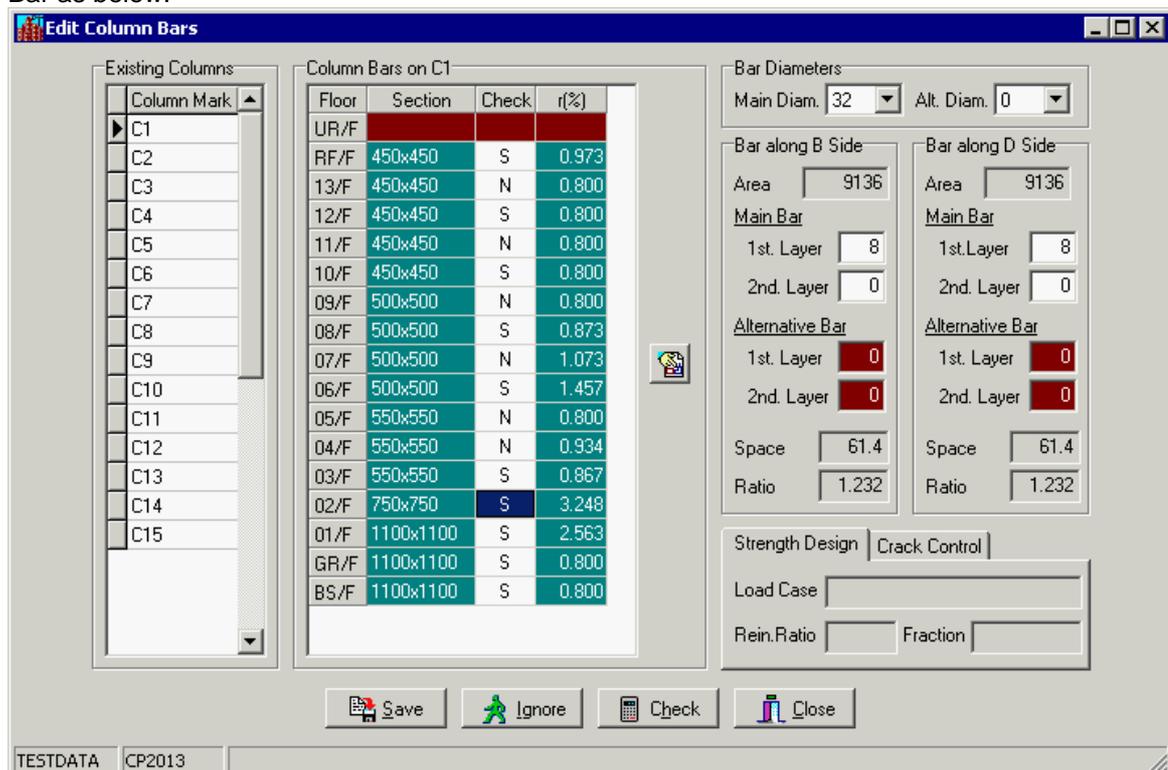
**Print Splice Location** - Check the check box if you want to include the calculation of splice position of column.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 8.8 Edit Column Bar Sub-command

The Edit Column Bar Sub-command allows you to edit the reinforced bars of columns which had been pre-designed and certainly all right.

When you choose Edit Column Bar from Column Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Edit Column Bar as below.



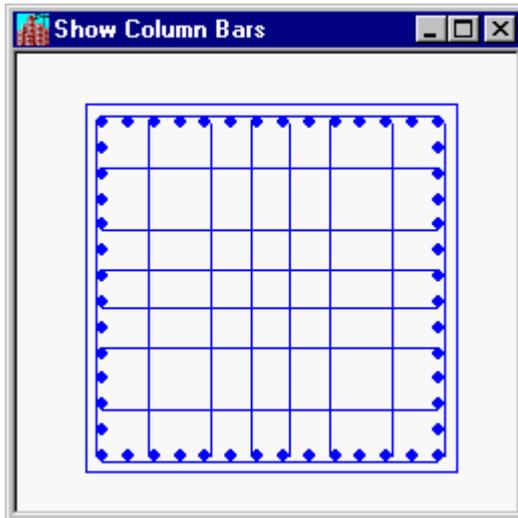
Sagging moments in X-X direction on the RHS of column.

**Existing Column Mark Group Box** : The list box is the listing of the existing column marks which have previously created. If you wish to edit the reinforced bars of existing column, click the column mark and edit it.

You may search the desired column mark using [incremental search](#) described in How to use SADS topic.

**Column Bars Group Box** : This group has four information : "Floor" is the floor code of the column, it should not be altered. "Section" is the information that you input in the column data previously, it also should not be altered. "Check" is the only box that you can edit, after SADS calculated the reinforcement ratio (r), you experiential want to make correction of the checking option, you may edit the check field, the options are as [the Column Data Sub-command](#). "r(%)" is the reinforcement ratio that had been calculate by SADS in column pre-design, it should not be altered too.

If you want to view graphically about the existing column bar, click  button, SADS will then graphically display the column bar on the dialog box.



**Bar Diameters Group Box** : You may edit the values of this group box as your desired.

**Diameter** - The diameter (in mm) of reinforced bars. **SADS** provides up to two different diameters in each section named the main bar and the alternative bar, the main bar must be always larger than alternative bar.

**Bar along B Side Group Box** : Indicate the reinforced bar which located at X-X direction. Same as above, you may edit the values of this group box as your desired.

**Area** - The area of reinforced bar in X-X direction. This field should not be altered by the user.

**Main Bar** - The number of the main reinforced bar which located at X-X direction. **SADS** provided up to two layer of main bar, the number of bar is correspond to the above "Diameter". If you want to edit, click the edit box and enter the number of bar, **SADS** will give the warning if the ratio is smaller than the defined value at the [Column Page of Master Data Sub-command](#).

**Alternative Bar** - The number of the alternative reinforced bar which located at X-X direction. **SADS** provided up to two layer of alternative bar, the number of bar is correspond to the above "Diameter". Same as Main Bar, you can edit it.

**Space** - Indicate the spaces of main bar and alternative bar at X-X direction. If you want to edit, click the edit box and enter the value, **SADS** will give the warning if the space is not satisfied the defined value at the [Column Page of Master Data Sub-command](#).

**Ratio** - The ratio of actual area and required area (in %) of reinforced bars in X-X direction . This field should not be altered by the user.

**Bar along D Side Group Box** : Indicate the reinforced bar which located at Y-Y direction. You may edit the values of this group box as your desired. All the information of this group box is same as the **B** side, refer to above section.

**Check Result Group Box** : If you change the reinforced bars, you may click  button to check whether the new reinforced bars is enough or not. The results of calculation are displayed in these pages.

**Strength Design Page:**

**Load Case** - display the critical load case for limit state design.

**Rein.Ratio** - display the reinforcement ratio.

**Fraction** - display the fraction of the critical load case.

**Crack Control Page:**

**Load Case** - display the critical load case for serviceability.

**Rein.Ratio** - display the reinforcement ratio.

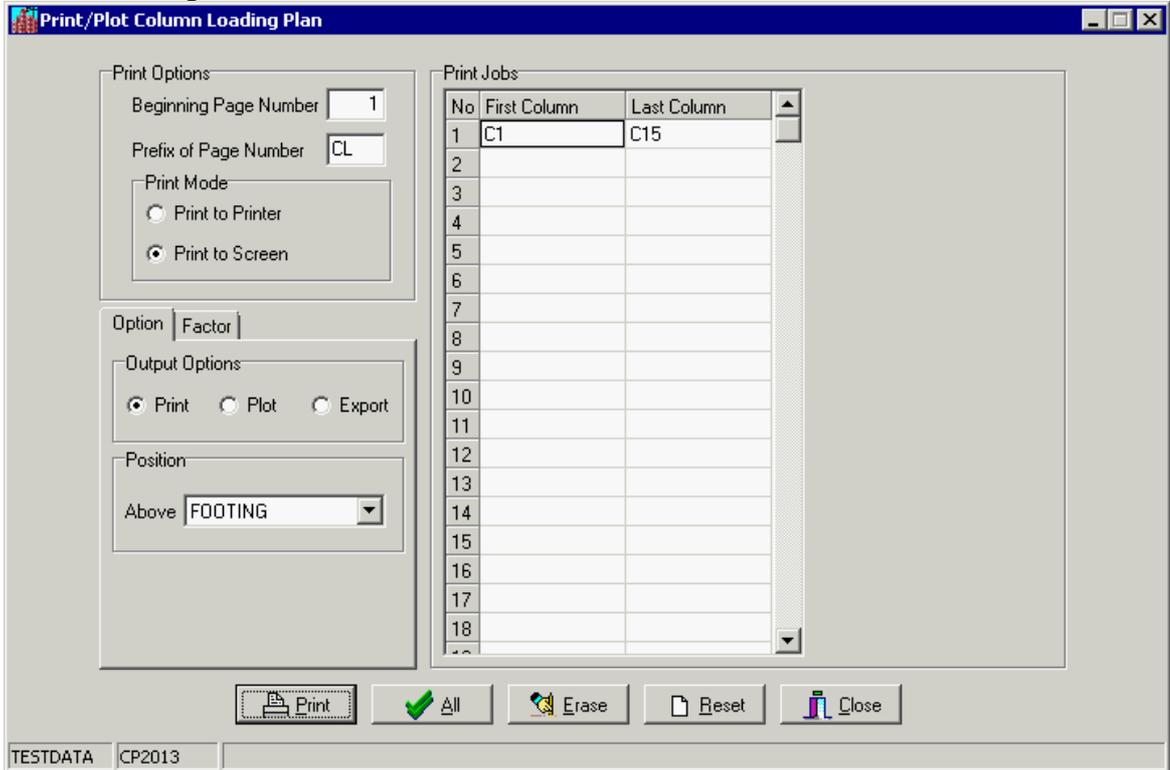
**Crack Width** - display the width of crack, unit: mm.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 8.9 Column Loading Plan Sub-command

The Column Loading Plan Sub-command allows you to print, display or plot loading plane of the existing columns for checking or for the reference of foundation design of the building.

When you choose the Column Loading Plan from Column Command or click  button on [Command Button Bar](#) then click  button [Sub-command Button Bar](#), **SADS** will display the Column Loading Plane as below.



No	First Column	Last Column
1	C1	C15
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "CL".

**Print Jobs Group Box:** Refer to [Take Column Loading Sub-command](#).

### Output Options Group Box:

**Print** option - print or display column loading plane.

**Plot** option - generate AutoLISP data files and AutoCAD script file. You can use the script file and data files to produce AutoCAD drawing and plot the loading plane inside **SADS** or by using AutoCAD program.

**Export option** - generate a text file contained column loading plane. You may use this text file to generate customize report.

**Position Group Box:** Specify the position of loading plane by a floor code. If you select FOOTING, **SADS** will print, export or plot the loading plane at the bottom of columns. If you select a floor code, e.g. GRD., **SADS** will print, export or plot loading plane above the floor code - GRD., exclude GRD. floor.

### Factors Group Box:

**Total Load** - Enter the value of the allowance factor of dead load and live load.

**Dead Load** - Enter the value of the allowance factor of dead load only.

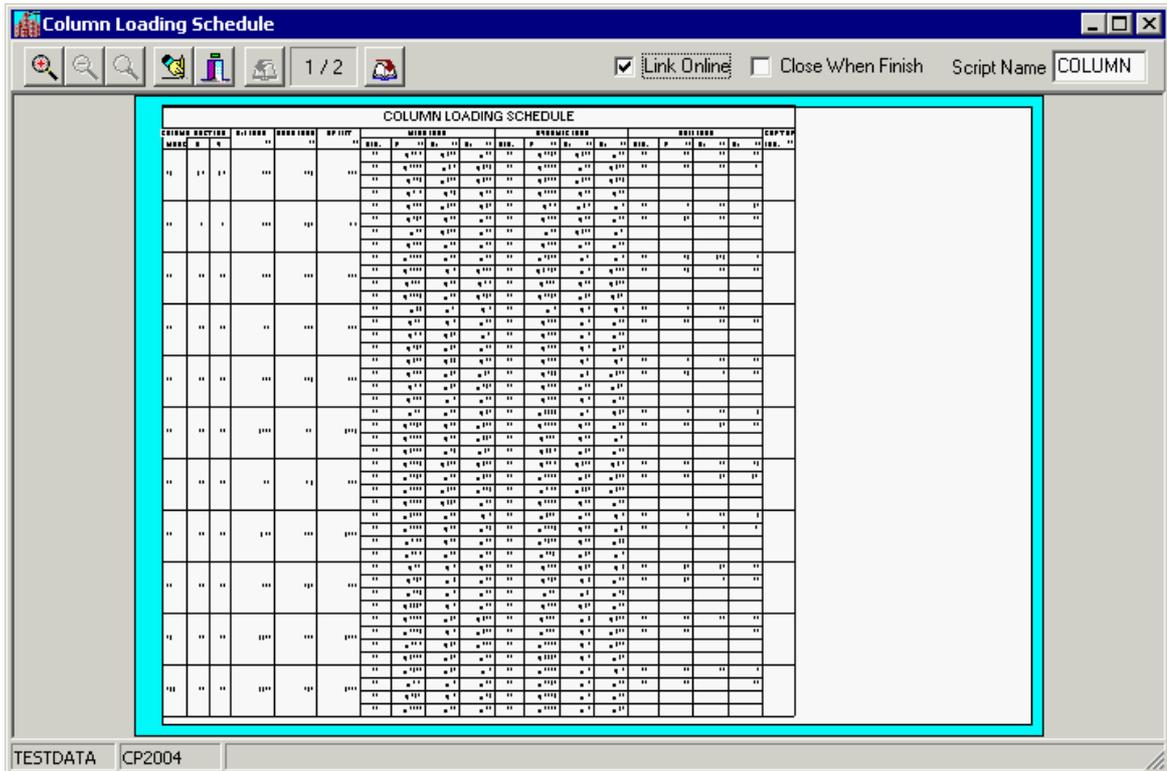
**Wind Load** - Enter the value of the allowance factor of wind load.

**Soil Load** - Enter the value of the allowance factor of soil load.

**Dynamic Load** - Enter the value of the allowance factor of dynamic load.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

If you select plot option in output options group box, **SADS** will display a preview window as below:



**Script Name** - Enter the name of script file. The maximum length of the name is 6 characters.

**Link Online** - Check the check box if you like to run the AutoCAD program automatically inside **SADS**. Other wise skip it.

**Close When Finish** - Check the check box if you want **SADS** to close AutoCAD program when all drawing are generated.

You may use the following buttons to perform difference tasks:

-  - Hold the left button of mouse to drag a rectangular area, then click the zoom in button to zoom the rectangular area.
-  - Click the zoom out button to return to the previous zoom level.
-  - Click the zoom all button to return to the original zoom level.
-  - Click the page up button to switch to previous drawing.
-  - Click the page down button to switch to next drawing.
-  - If you check the "Link Online" check box, when you click "OK" button, **SADS** will run the AutoCAD program automatically and display the drawing. If you uncheck the "Link Online" check box, when you click "OK" button, **SADS** will then generate AutoLISP data files and AutoCAD Script file, these files are stored in project data folder. When you run AutoCAD program, you may choose Tools | Run Script menu, then select the script file from dialog box, the AutoLISP program will generate all drawings.
-  - Click the cancel button to cancel the processing.

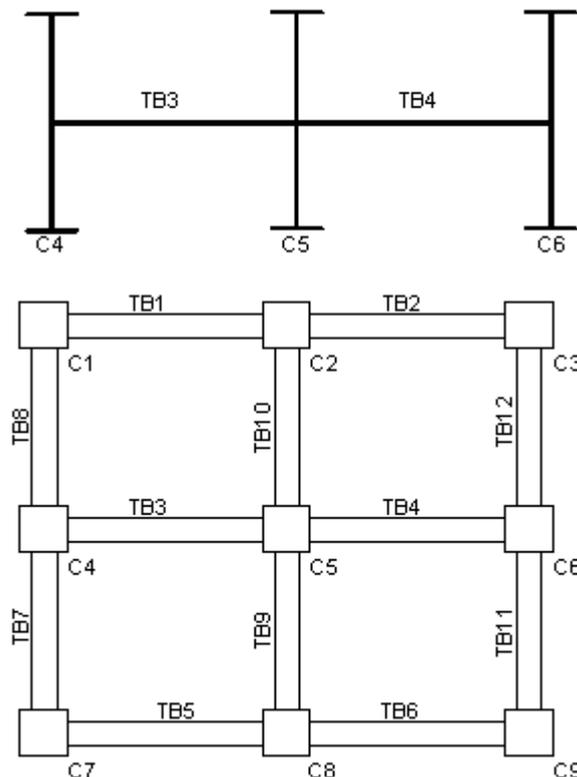
## 9 Beam-column Joint Command

### 9.1 About Beam-column Joint Command

The Beam-column Joint Command allows you to check the beam-column joints according with Clause 6.8 in CoP2013. Due to the limitation of formulas in Clause 6.8, this checking is available for rectangular section column. All circular section columns are skipped in this checking. Also, all connected beams should either parallel to X axis or Y axis. The beams that in diagonal directions will be ignored. But, if you set [maximum deviation angle](#) in Joint Page of Master Data to greater than zero, **SADS** will considers connected beams that have deviation angle with X axis or Y axis into checking of beam-column joint.

All data for this checking are retrieved from **SADS** database. Users don't need to input any extra data. These data are retrieved when you run Beam Pre-design Sub-command and Column Pre-design Sub-command. So, you should make sure that these 2 sub-command were run successfully before you run the Beam-column Joint Design Sub-command.

The most important requirement of the retrieved data is the consistency between beam support data and column beam data. The following example explains this requirement.



In column data, there are 4 beams (TB3, TB4, TB9 and TB10) are connected to column C5. In beam batch data, there are 2 continuous beams (TB3~TB4 and TB9~TB10) using column C5 as its support. The column beam data must be input as below.

Beam mark	Flag	Angle
TB3	R	180
TB4	L	0
TB9	R	270
TB10	L	90

The direction field in batch data of TB3~TB4 must be X and TB9~TB10 must be Y. The second support in batch data of these 2 continuous beams must be C5 with type CL. Any error of these data will cause problems in beam-column joint design and will be listed in pre-design procedure. You must fix all listed problems and run pre-design again until no more error is listed.

When you choose Beam-column Joint from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the beam column joint sub-command buttons are display as below.



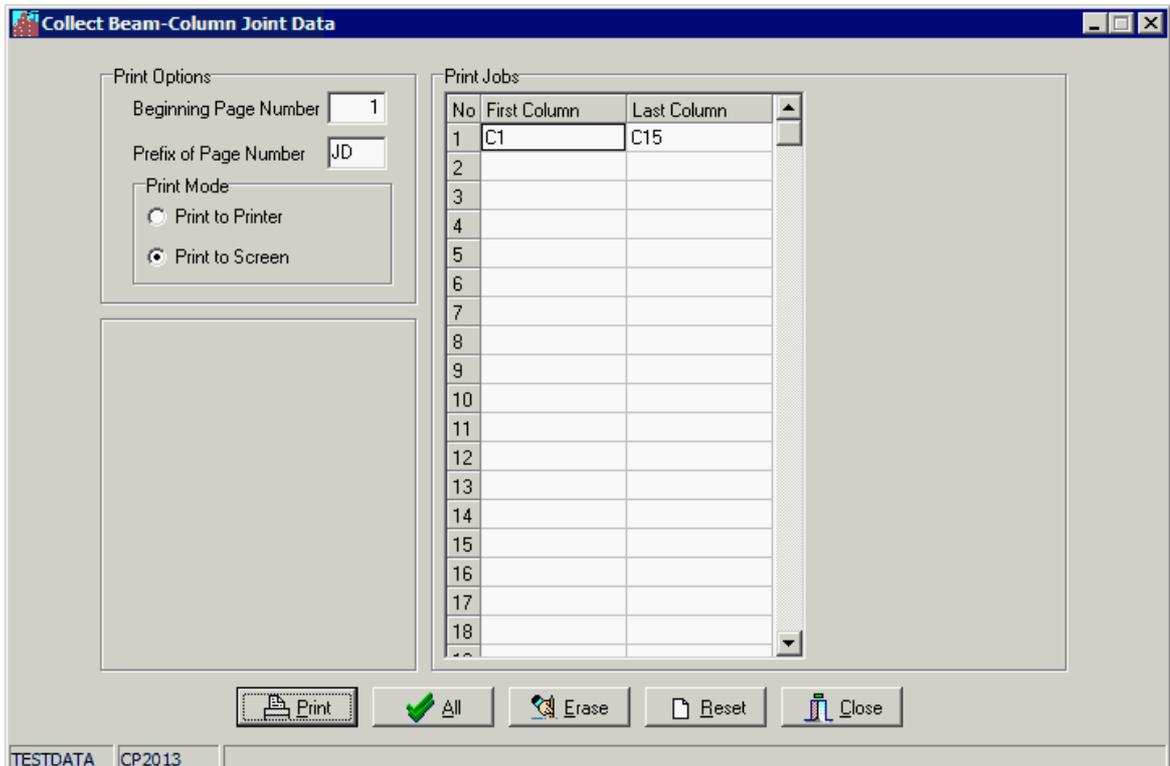
The Sub-commands are:

1. Collect Joint data Sub-command.
2. Change Joint Data Sub-command.
3. Design Joint Sub-command.
4. Edit Joint Bars Sub-command.

## 9.2 Collect Joint Data Sub-command

The Collect Joint Data sub-command is used to collect joint data from column data and beam batch data.

When you choose Joint Collect Data from Joint Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Joint Collect Data as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "JD".

### Print Jobs Group Box:

**First Column** - Use the combo box to select the beginning joint mark which going to be collected the joint data.

**Last Column** - Use the combo box to select the last column mark which going to be collected

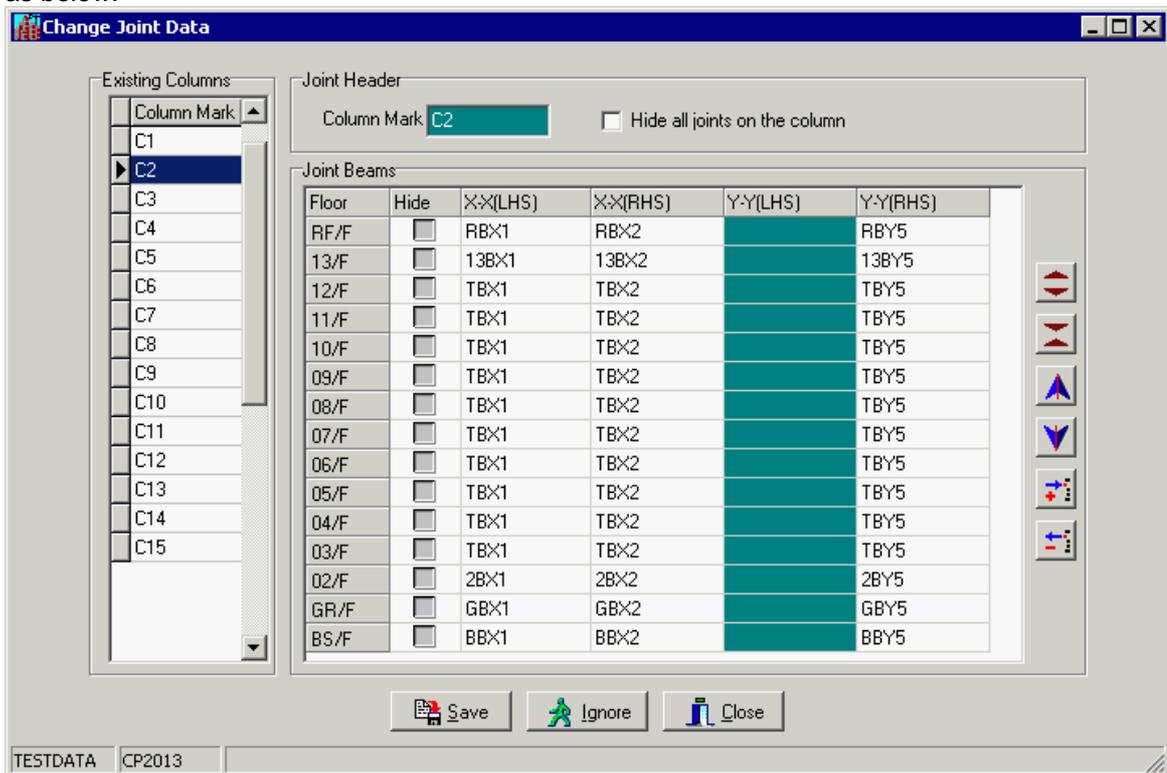
the joint data.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 9.3 Change Joint Data Sub-command

The Change Joint Data sub-command is used to edit an joint data that collected by Collect Joint Data sub-command. Usually, all beams that connected to a column at the same floor have the same level. In this case, you don't need to change this joint data. In some special cases, these beams may have different levels. You may use this sub-command to change the joint data to reflex these cases.

When you choose Joint Edit Data from Joint Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Change Joint Data as below.



**Existing Column Mark** - The list box is the listing of the existing column marks. You may search the desired column mark using [incremental search](#) described in How to use SADS topic.

#### Joint Header :

**Column Mark** - The selected column mark.

**Hide all joints on the column** - You can click this check box to hide all joint on this column.

#### Joint Beams Group Box :

**Hide** - Click the check box to hide the beam marks.

**X-X(LHS)** - Beam mark in X-X direction on the left hand side of column.

**X-X(RHS)** - Beam mark in X-X direction on the right hand side of column.

**Y-Y(LHS)** - Beam mark in Y-Y direction on the left hand side of column.

**X-X(RHS)** - Beam mark in Y-Y direction on the right hand side of column.

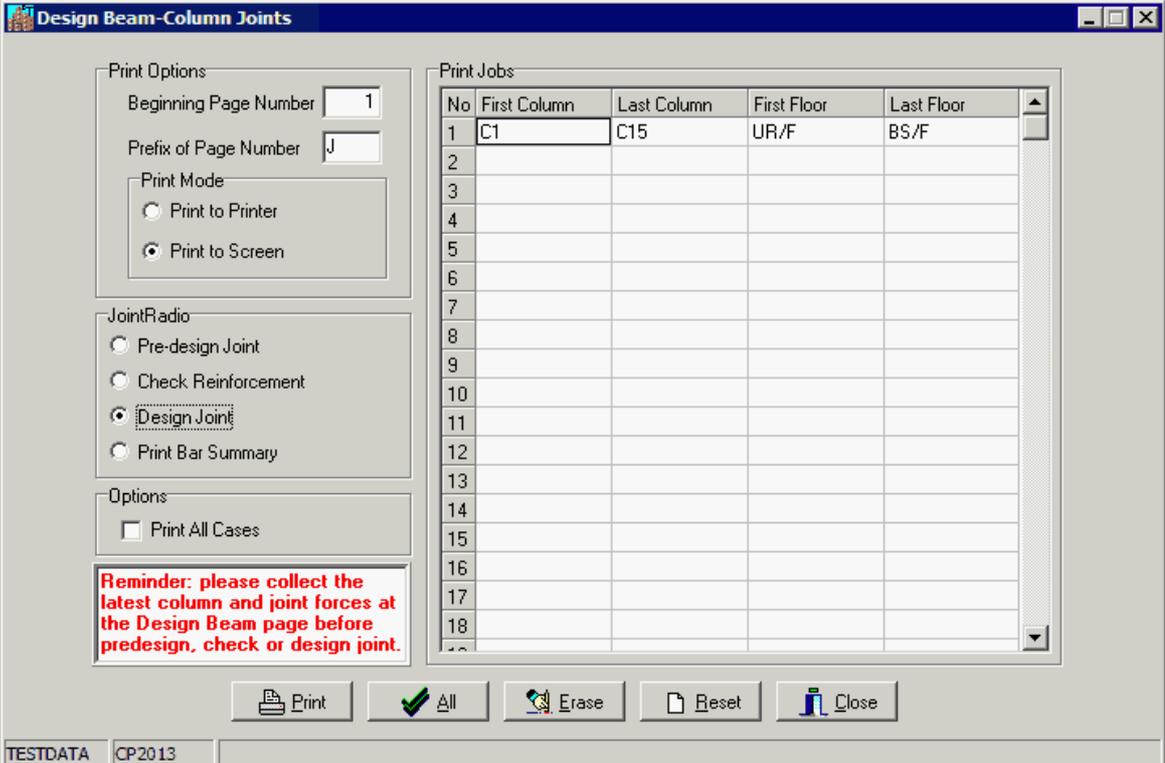
If the connected beams have different levels on particular floor, you may click one of the beam on

the floor and click Expand button  to insert an addition level of floor. Then, you may click the beam that you want to move to different level and click the Move Up button  or Move Down button . This sub-command allows you to expand up to 4 different levels in one floor. If you find that you have expand too many levels, you may click the redundant level and click the Shrink button  to remove the level. All beams in the removing level will be move up or move down to the next level. You may click the Insert button  to insert available beam mark to joint, or click the Delete button  to delete a beam mark from joint data.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 9.4 Design Joint Sub-command

When you choose the Joint Design from Joint Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Beam-column Joint Design as below.



No	First Column	Last Column	First Floor	Last Floor
1	C1	C15	UR/F	BS/F
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "J".

**Print Jobs Group Box:** Refer to [Print Column Report Sub-command](#).

**Report Type Group Box:** Click the radio button and select Pre-design Joint or Design Joint.

**Pre-design Column** - Click the radio button if you want to pre-design the joint. It validates data and displays any errors on screen. It checks the joint shear and prompts when the shear is greater than the maximum allowable shear. It provides the diameter and number of closed links according to the result of calculation.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars without alter the sketch of joint sketch. **SADS** will generate a report if some of joint sections are under designed. Before you run this option, you must complete the

Pre-design of joint. If you check the Adjusting Reinforcement check box, all under designed reinforced bars will be increased automatically.

**Design Column** - Click the radio button to print out the calculation of beam-column joints in the building for the submission to B.D. Before you run this option, you must complete the pre-design of joints and edit the sketch of joints if it is necessary.

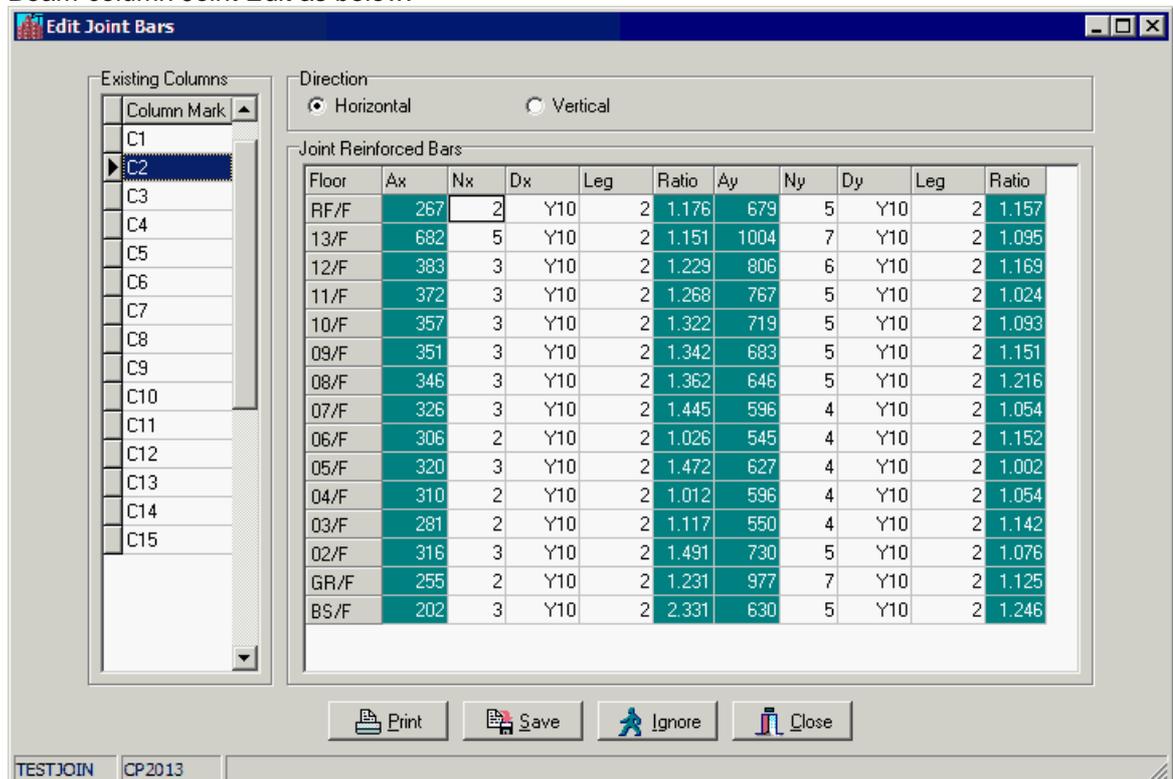
**Print Bar Summary** - Print a summary of joint reinforcement for your reference.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 9.5 Edit Joint Bars Sub-command

If you don't satisfy the provided reinforced bars by pre-design joint sub-command, you may run the edit beam-column joint bars sub-command to adjust these bars.

When you choose the Joint Edit Bars from Joint Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Beam-column Joint Edit as below.



Floor	Ax	Nx	Dx	Leg	Ratio	Ay	Ny	Dy	Leg	Ratio
RF/F	267	2	Y10	2	1.176	679	5	Y10	2	1.157
13/F	682	5	Y10	2	1.151	1004	7	Y10	2	1.095
12/F	383	3	Y10	2	1.229	806	6	Y10	2	1.169
11/F	372	3	Y10	2	1.268	767	5	Y10	2	1.024
10/F	357	3	Y10	2	1.322	719	5	Y10	2	1.093
09/F	351	3	Y10	2	1.342	683	5	Y10	2	1.151
08/F	346	3	Y10	2	1.362	646	5	Y10	2	1.216
07/F	326	3	Y10	2	1.445	596	4	Y10	2	1.054
06/F	306	2	Y10	2	1.026	545	4	Y10	2	1.152
05/F	320	3	Y10	2	1.472	627	4	Y10	2	1.002
04/F	310	2	Y10	2	1.012	596	4	Y10	2	1.054
03/F	281	2	Y10	2	1.117	550	4	Y10	2	1.142
02/F	316	3	Y10	2	1.491	730	5	Y10	2	1.076
GR/F	255	2	Y10	2	1.231	977	7	Y10	2	1.125
BS/F	202	3	Y10	2	2.331	630	5	Y10	2	1.246

**Existing Column Mark Group Box** : The list box is the listing of the existing column marks which have previously created. If you wish to edit the joint reinforced bars on existing column, click the column mark and edit it.

You may search the desired column mark using [incremental search](#) described in How to use SADS topic.

**Direction Group Box**: You may click Horizontal or Vertical options to display the bars of horizontal links or vertical links.

**Joint Reinforced Bars Group Box** : This group has 11 fields.

**Floor** - The floor code of the column, it should not be altered.

**Ax** - The required bar area in X-X direction.

**Nx** - The number of provided closed links in X-X direction.

**Dx** - The diameter of provided closed links in X-X direction.

**Leg** - the leg number of provided closed links in X-X direction.

**Ratio** - The ratio of provided bar area and required bar area in X-X direction. If this ratio is less than 1.0, the number is shown with red color to warn the user.

**Ay** - The required bar area in Y-Y direction.

**Ny** - The number of provided closed links in Y-Y direction.

**Dy** - The diameter of provided closed links in Y-Y direction.

**Leg** - the leg number of provided closed links in Y-Y direction.

**Ratio** - The ratio of provided bar area and required bar area in X-X direction. If this ratio is less than 1.0, the number is shown with red color to warn the user.

You can click the Print button to print summary of reinforced bars of joints. You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

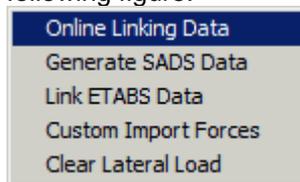
## 10 Analysis Command

### 10.1 About Analysis

In the Analysis Command, you have 3 choices to link the data between **SADS** and ETABS.

- Online Linking Data: This is the best linking sub-command. All linking is done directly between **SADS** database and ETABS database. Please refer to [Overview](#) in Online Linking Data topic.
- Generate **SADS** Data: This sub-command can generate **SADS** data partly. It creates linking using ETABS output MDB file. Please refer to [Overview](#) in Generate SADS Data topic.
- Link ETABS Data: This sub-command is easy relatively. It is using ETABS output MDB file to map and link the ETABS and **SADS** data. Please refer to [Overview](#) in Link ETABS data topic.

When you choose Analysis command from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button on , the analysis sub-command buttons are display as below.



The Sub-commands are:

1. Online Linking Data Sub-command.
2. Generate **SADS** Data Sub-command.
3. Linking ETABS Sub-command.
4. Custom Import Forces Sub-command.
5. Clear Lateral Load Sub-command.

## 10.2 Online Linking Data

### 10.2.1 Overview

The Online Linking Data Sub-command is using ETABS OAPI package. This linking function needs only **SADS** project data files. Users don't need to prepare ETABS data and provide mapping information between **SADS** and ETABS. This is a two ways linking. We can transfer data from **SADS** to ETABS. Also, we can transfer data from ETABS to **SADS**. All data is transferred directly. No any intermediate file or media is needed. It is the most efficiency linking function.

Using this online linking function, we can transfer story data, material properties, section properties, connectively data and lateral load data from **SADS** to ETABS. We can call ETABS OAPI function from **SADS** to create ETABS model, run analysis and export the forces to **SADS** for designing beams, columns, walls and lintels. When we run pre-design sub-commands in **SADS**, we may get many amended section properties and material properties. We can easily to transfer these properties to ETABS to amend the ETABS model. Then, we can run analysis function again a export the new forces to **SADS**. These processing can be done by a few click on the keyboard.

The online linking function relies the quality of SADS data. If the SADS data complete, accurate and error free, the result in this function will be very good and trouble free. So, you should run Beam Validation Sub-command, Column Validation Sub-command, Wall Validation Sub-command and Lintel Validation Sub-command and fix all errors before you start using OAPI Online Linking function.

Furthermore, this online linking function provides comprehensive validation for **SADS** database. This function can display framing plans for searching any errors in database. Also, this function provides text based validation for further checking.

### 10.2.2 Prepare Lateral Load

The first step in online linking is preparing lateral loads that will be applied to the building.

- **Wind load:** you can run [Wind Shape Factor Sub-command](#) to calculate the shape factor of your building. Then run [Wind Load Sub-command](#) to calculate the values of wind load at each floors. If you are calculating the wind shape factors and wind load by hand or third party application, you may enter these wind loads using [Lateral Load Sub-command](#).
- **Soil and dynamic load:** You can input these loads using [Lateral Load Sub-command](#).

### 10.2.3 Collect Data

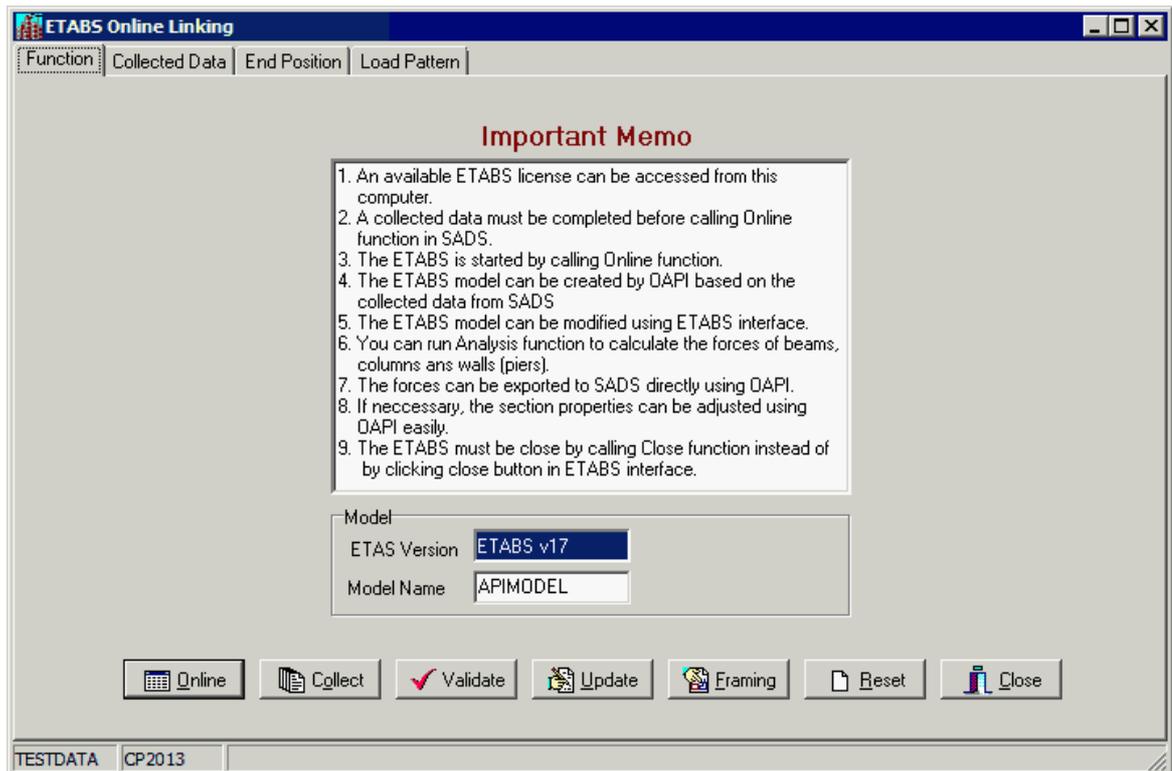
The ETABS Data sub-command is use to collect, validate and update the output file for online linking.

When you choose ETABS Data from Analysis Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the ETABS Online Linking as below.

The ETABS Online Linking sub-command have four pages.

1. Function Page.
2. Collect Data Page.
3. End Position Page.
4. Load Pattern Page.

Click the Function Page, SADS will display the following window.



The ETABS version usually shows the newest and accepted ETABS program. The **SADS** can link to this ETABS program only. If you are installing older ETABS program, e.g. ETABS 2016 or ETABS 2015, you may request your dealer to get the **SADS** version that can link to your specific ETABS version.

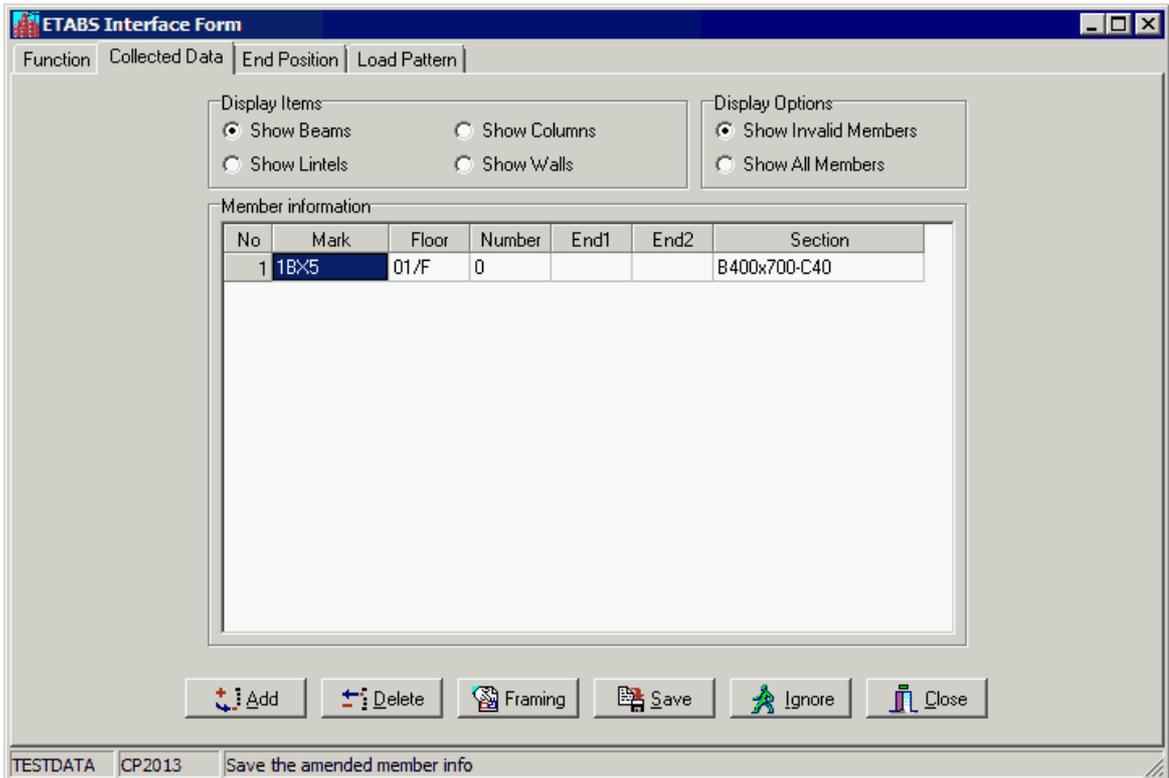
You need to define the OAPI model name. The default name is APIMODEL. You can define one OAPI model name only in a project.

In the online linking function, the following data will be collected.

1. Story data: the data are simply collected from floor data.
2. Material properties: the data are collected from concrete grade data.
3. Section properties: the data are collected from section sizes of beams, columns, walls and lintels.
4. Load data: the data are collected from [Lateral Load Sub-command](#), please refer to previous topic.
5. Connectivity data: the data are the most complicate data.
  - Column: we can get these connectivity data from coordinate X and Y in column header data.
  - Wall: we can get these connectivity data from coordinate X, Y and incline angle in wall header data and wall section described in [wall section page](#).
  - Lintel: we can get these connectivity data from coordinate X, Y in Lintel header data.
  - Beam: we are using deep searching process to collect these connectivity data. Please refer to "**SADS** Online Link Demonstration".

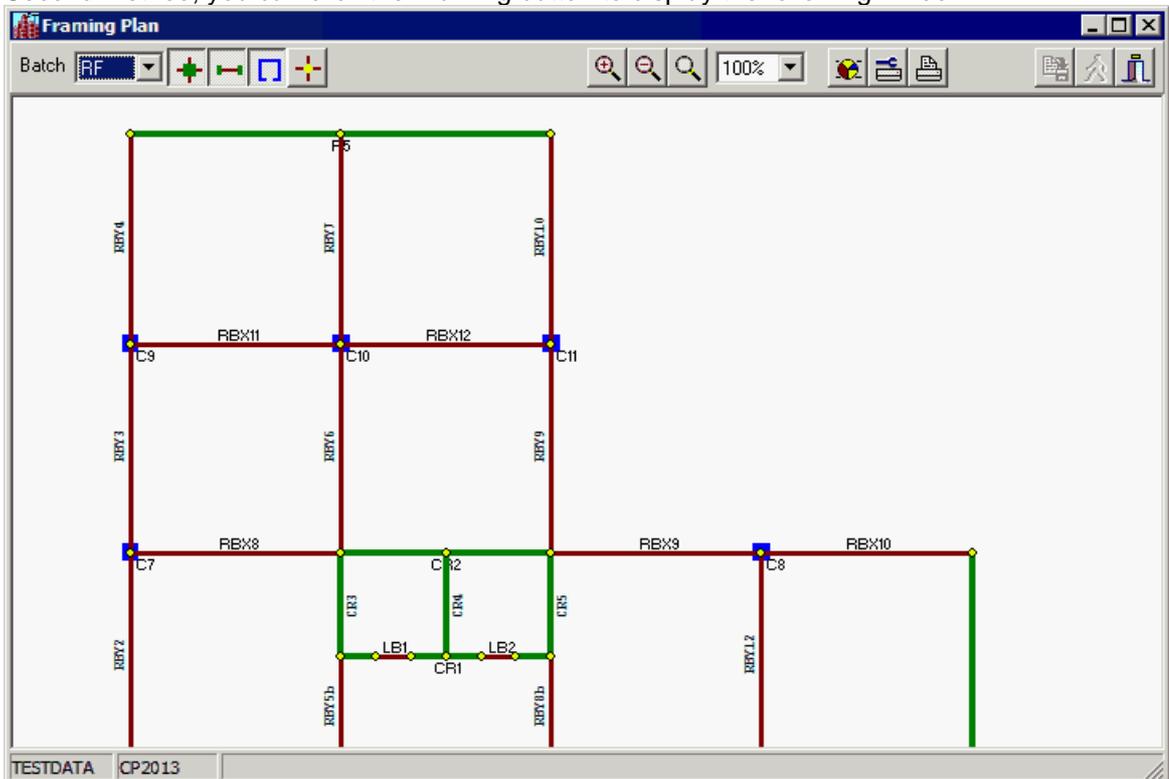
If you are ready, you can click the Collect button to collect the connectivity data for beams, lintels, columns and walls. SADS provides 3 validation functions for checking the collected data.

First method, you can click the Collected Data TAB to display the following window.



You can select what type of members you want to check in Display Items select box.. In this window, the beam is selected. In the display Options, you may select to show invalid members or all members. For checking errors, you should select show invalid members option. If your project data has no error, the grid will show nothing. This window shows 1Bx5 has no point label on both ends. It is for example only.

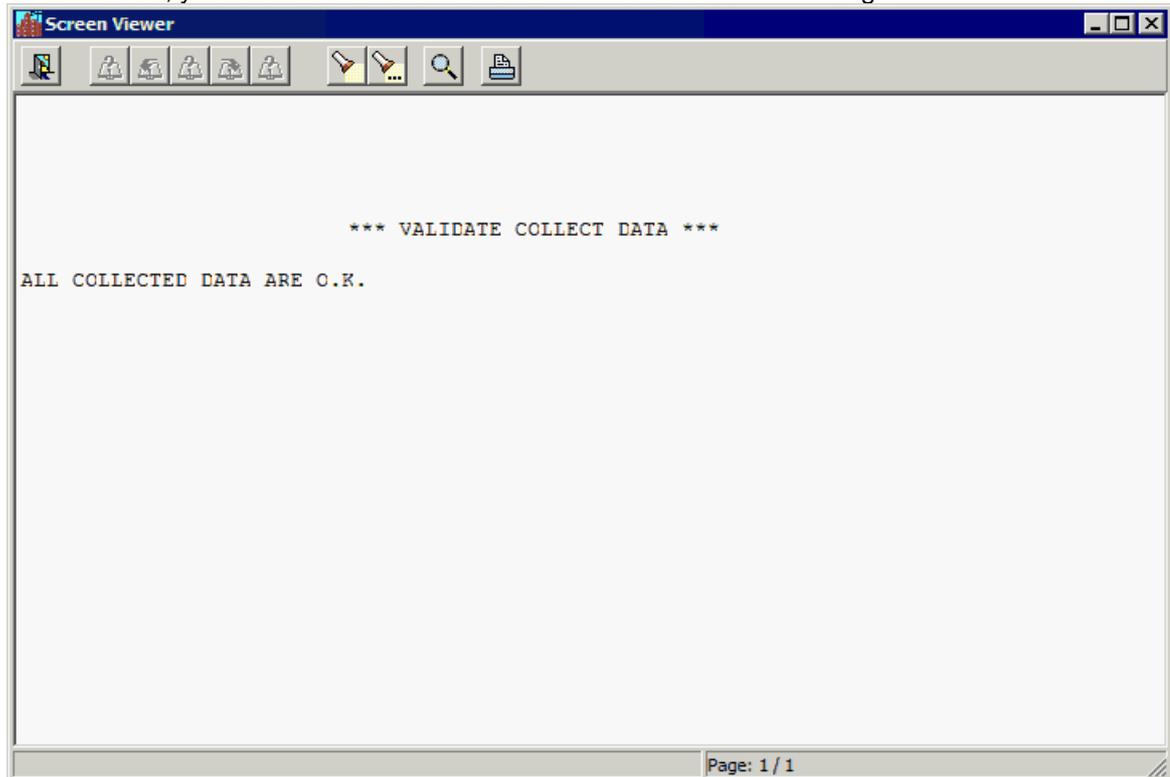
Second method, you can click the Framing button to display the following window.



You can check the framing plan on all batches. If the framing plans are correct, you may proceed to third method for further checking. If there are errors in framing you can find out the problem in

your project data and fix it. Please refer to "**SADS** Online Link Demonstration".

Third method, you can click the valid the Validate button on Function Page.

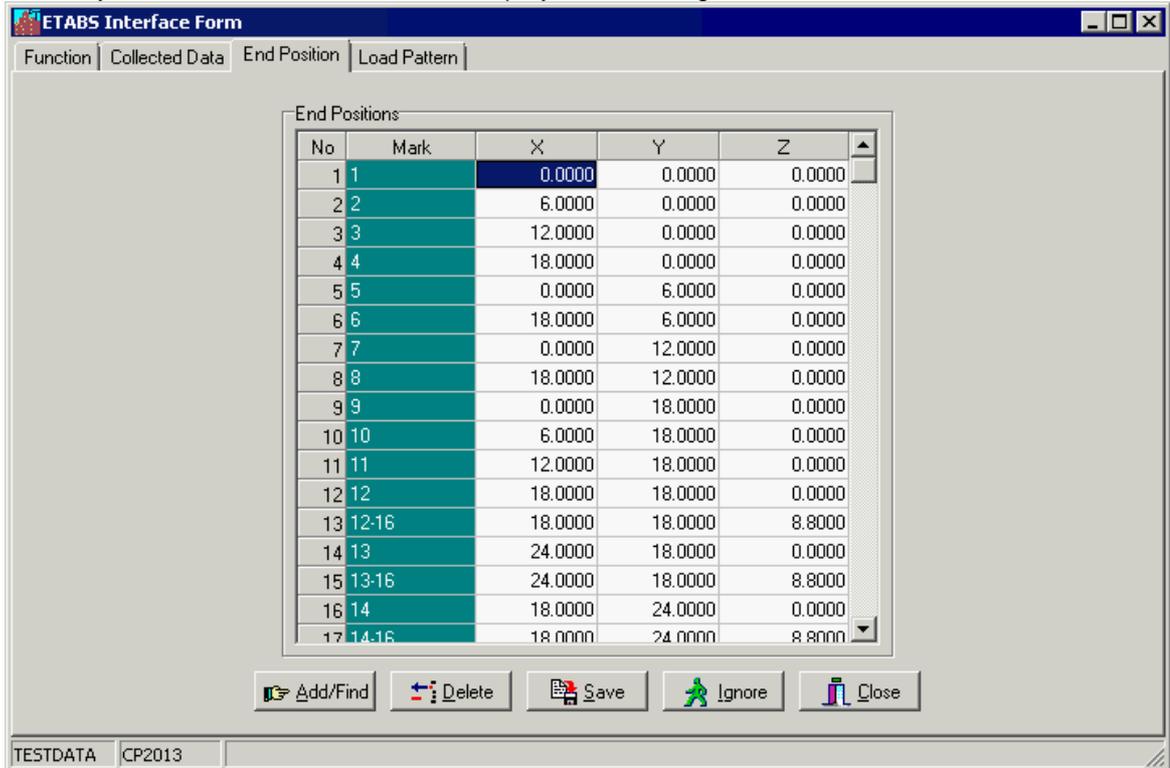


If there are some errors, **SADS** will show these errors, otherwise ALL COLLECTED DATA ARE O.K. is shown.

In rare case, if the framing plans becomes confusion, you may click the Reset button on Function Page and click the Collect button to recover your framing plans.

## 10.2.4 End Position

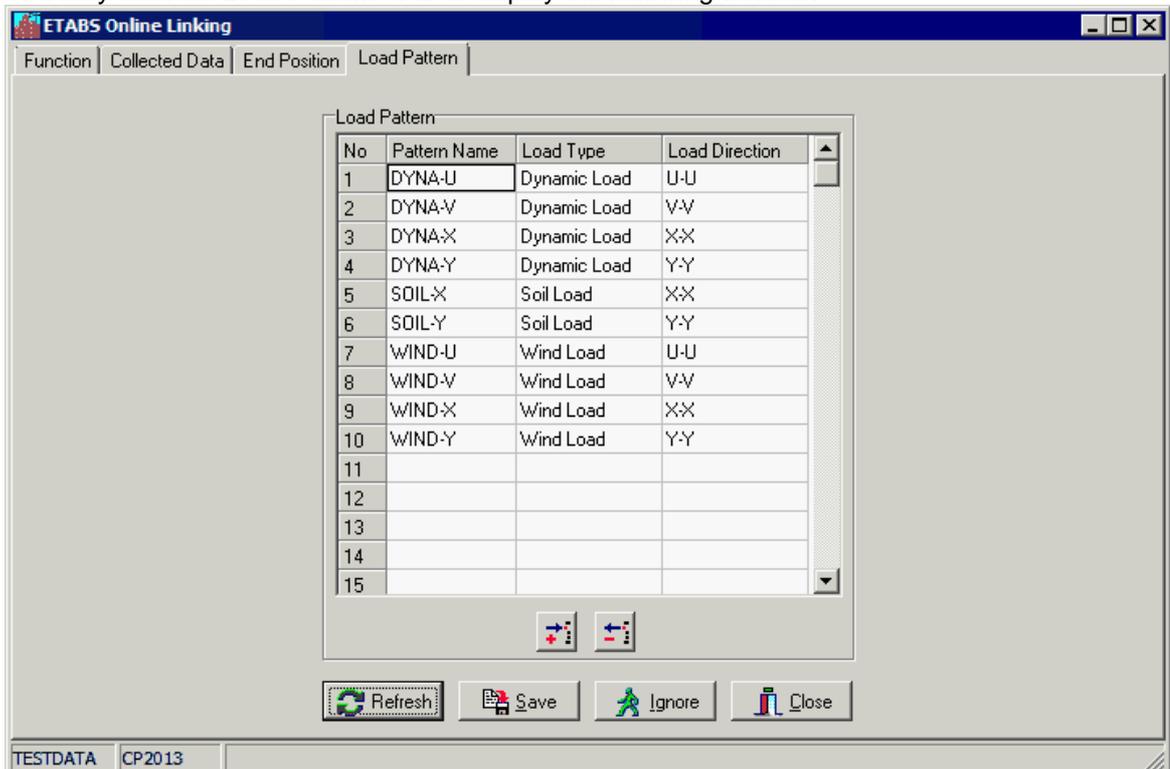
You may click the End Position TAB to display the following window.



The end data are created by **SADS** automatically. This screen is displayed for your reference only.

## 10.2.5 Load Pattern

You may click the Load Pattern TAB to display the following window.



These load patterns are retrieved from [Lateral Load Sub-command](#). You may add, insert or delete the load pattern. All load patterns you selected will be transferred to ETABS model.

## 10.2.6 Link to ETABS

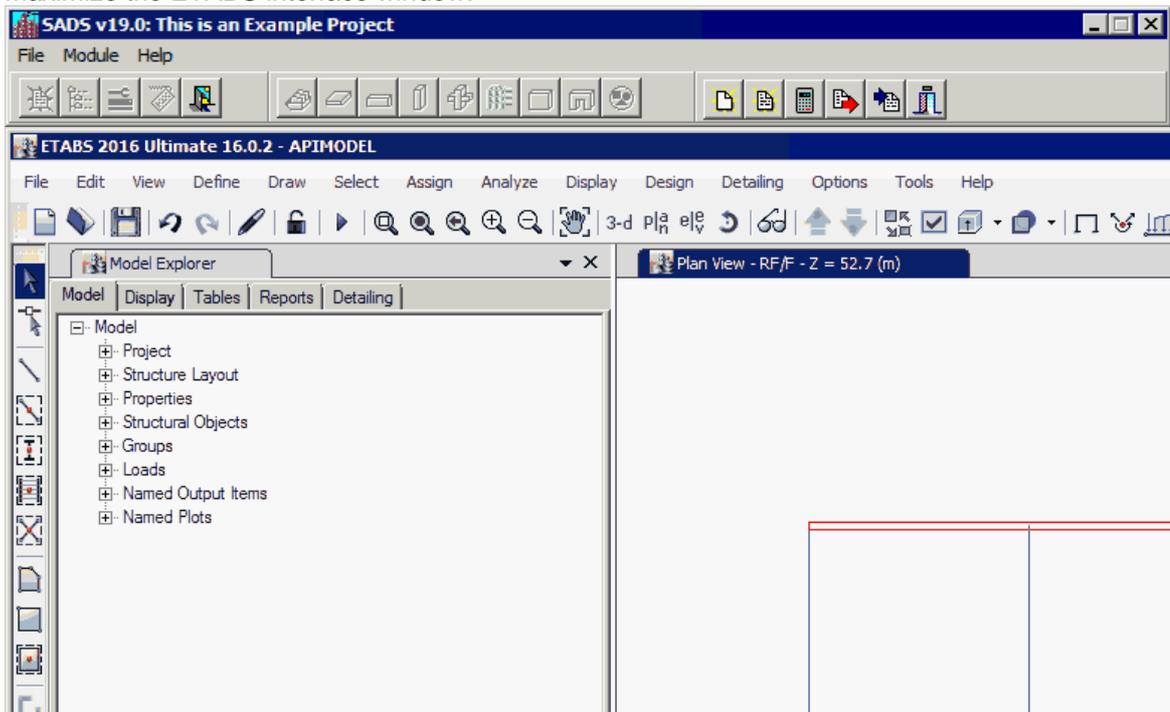
You can click the Online button on Function Page to create the linking between **SADS** and ETABS. When the linking is created properly, The Main Menu of **SADS** is changed as below.



Most of original speed buttons are disabled to prevent users run other commands and sub-commands in **SADS**. The speed buttons of sub-commands are changed as below.

- Create Model button - Click this button to create a new ETABS model using the collected data.
- Open Model button - Click this button to open an existing ETABS model.
- Run Analysis button - Click this button to configure the load cases option and run model analysis.
- Import Forces button - Click this button to import beam, column, wall and lintel forces from ETABS to SADS.
- Export Properties button - Click this button to Export section and material properties from SADS to ETABS.
- Close Linking button - Click this button to close the ETABS application and return to SADS original menu.

The ETABS interface window is displayed below the new SADS main menu. You can align the top of ETABS window to the bottom of SADS main window, align the bottom of ETABS window to the top of Task Bar, align the left and right side of ETABS window to the side of your desktop to maximize the ETABS interface window.



The first job you need to do is clicking the Create Model button to retrieve **SADS** data to create OAPI model that you prepared in **SADS**. After the model is created successfully, you can perform one more validation by ETABS interface.

## 10.2.7 Run Analysis

After you check the model carefully, you can click the Run Analysis button to analyze your model.



You may check the results by ETABS interface.

## 10.2.8 Import Forces

After you check the analysis results, you may click the Import Forces button to transfer the beam forces, lintel forces, column forces and pier forces to SADS.



Then, you can click Close Linking button to release the linking of ETABS and return to **SADS**.

Now, you can run Beam Pre-design Sub-command, Column Pre-design Sub-command, Wall Pre-design Sub-command and Lintel Pre-design Sub-command. You may find many sections that you set in original data are not justified with code of practice requirement. You need to adjust the sizes of sections and / or adjust the grades of concrete.

## 10.2.9 Export Properties

After you import frame forces and pier forces to SADS, you can run Beam Pre-design Sub-command, Column Pre-design Sub-command, Wall Pre-design Sub-command and Lintel Pre-design Sub-command. You may find many sections that you set in original data are not justified with code of practice requirement. You need to adjust the sizes of sections and / or adjust the grades of concrete. After these adjustments are made, you may re-analyze the model in ETABS. It is very easy in the new SADS 20. You click the Update button in [Function page](#) to update the collect data.

Then, you should click the Online button to link to ETABS again.



You can click the Export Properties button and SADS will transfer all material properties and section properties to ETABS OAPI model.

Then, you can re-run the analysis function in ETABS and re-import frame forces and pier forces from ETABS to SADS

## 10.2.10 Close Linking

Please do not close ETABS application by clicking Close menu item in ETABS. You must click the Close Linking button in **SADS** main menu. Otherwise, some problem may happen.

## 10.3 Generate SADS Data Sub-command

### 10.3.1 Overview

The Generate **SADS** Data sub-command is good when you have only input ETABS data and have not input SADS data. Using the link, you can create the mapping between ETABS data and **SADS** data. You can also generate **SADS** data partly from ETABS output MDB file. Then, you need to input all other necessary SADS data.

The MDB Access file must contains the following tables.

ETABS v2013	ETABS v9.x
1. Program Control table	Control Parameters table
2. Shell Assignments - Pier/Spandrel table	Area Piers/Spandrels table
3. Beam Connectivity Data table	Beam Connectivity Data table.
4. Beam Forces table	Beam Forces table.
5. Column Connectivity Data table	Column Connectivity Data table.
6. Column Forces table	Column Forces table
7. Grid Lines table	Grid Lines table.
8. Floor Connectivity Data table	Floor Connectivity Data table.
9. Frame Assignments - Summary table	Frame Assignments Summary table.
10. Frame Assignments - Local Axes table	Frame Local Axes table.
11. Frame Assignments - Sections table	Frame Section Assignments table.
12. Frame Sections table	Frame Section Properties table.
13. Material Properties - Concrete table	Material Properties table.
14. Pier Forces table	Pier Forces table
15. Pier Section Properties table	Pier Section Properties table.
16. Joint Coordinates Data table	Point Coordinates table.
17. Shell Sections - Summary table	Shell Section Properties table.
18. Story Data table	Story Data table.
19. Wall Connectivity Data table	Wall Connectivity Data table.
20. Shell Assignments - Sections table	Wall/Slab/Deck/Opening Assigns.
21. Brace Connectivity Data table	Brace Connectivity Data table.
22. Brace Forces table	Brace Forces table.
23.	Ramp Connectivity Data table

Notes: The tables in item #21, #22 and #23 are required when the ETABS model includes ramp structure.

The sub-command will generate the following data files in SADS database.

1. Batch code data;
2. Floor data;
3. Slab data;
4. Beam batch data;
5. Beam data;
6. Beam load data;
7. Column data;
8. Column beam data;
9. Wall data;
10. Wall section data;
11. Wall load data;
12. Lintel beam data;
13. Lintel beam load.

If ETABS does not include slabs and / or secondary beams, you need to input these data manually after the data generation is completed. You need to input addition loads to beams, walls and lintels that not included in ETABS mdb file. Also, you need to input additional batch codes, slabs, beams, columns, walls and lintels that not included in ETABS mdb file.

The Generate **SADS** Data sub-command uses the same map data with [Link ETABS Data](#) sub-command. If you have generated **SADS** data with this sub-command, the mapping section of Link ETABS Data sub-command is done automatically, except the loading case mapping.

### 10.3.2 Recommendation

The following recommendations are applied to both Generate **SADS** Data Sub-command and Link ETABS Data Sub-command.

The recommendations for computer hardware:

1. Dual monitor or large size wide screen monitor to display framing plan in these modules;

2. Color printer to print framing plan in these modules.

The recommendations for preparing ETABS data:

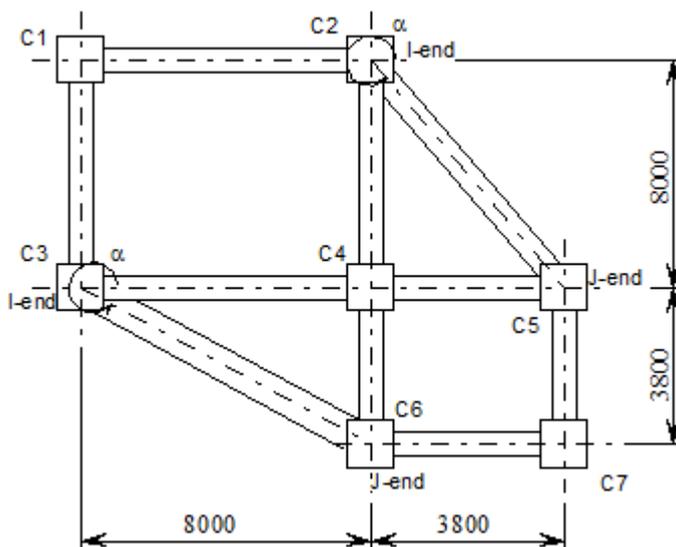
1. Delete unnecessary material names in ETABS data.
2. Make the material names in ETABS same as the concrete grade name in **SADS** and assign all material names by less than or equal to 10 characters long.
3. Make the level names in ETABS same as the floor codes in **SADS** and assign all level names by 4 characters long exactly.
4. Make the pier names in ETABS same as the wall marks or sub-wall marks in **SADS** and assign all pier names by less than or equal to 8 characters long.
5. Make the line names in ETABS same as the column marks in **SADS** and assign all line names by less than or equal to 8 characters long.
6. Do not define multiple bays for one span of beam in **SADS** when there is no framed beam and / or column on the beam. If the beam has loading from framed beam and column, you should split the bay to multiple bays using the points of these loads.
7. Set the first character in section ID of beam as below:
  - A -- for associate beams, e.g. AB400X1000;
  - G -- for girder, e.g. GB400x600;
  - L -- for lintel beams, e.g. LB250X600;
  - S -- for secondary beams, e.g. SB300X500;
  - B -- for other beams, e.g. B400x700.

The length of section ID must not longer than 16 characters.

8. Delete unnecessary load cases in ETABS.
9. Make the load case name in ETABS follow the rules listed below.
  - The length of load case name not longer that 8 characters.
  - The first character of load name is "W" for wind load, "D" for dynamic load and "S" for soil load.
  - The last character of load name equal to character of Lateral Load Direction in [General page](#) of Master Data.

If your ETABS MDB file does not meet the recommendation, the Generating **SADS** Data and Linking ETABS Data modules will still accept these MDB files. But, you may make more key strokes and **SADS** will do more works.

ETABS has a rule for defining I-end and J-end of bays. This rule may not match with the rule for defining LHS end and RHS end in **SADS**. The following example demonstrates the different between **SADS** and ETABS.



- For horizontal bay, ETABS sets the I-end to left end and J-end to right end. For example, the bay between C1 and C2, the I-end is taken at C1 and J-end is taken at C2. This is then same as **SADS**
- For vertical bay, ETABS sets the I-end to lower end and J-end to upper end. For example,

the bay between C1 and C3, the I-end is taken at C3 and J-end is taken at C1. This is the same as **SADS** also.

- For diagonal bay, **SADS** is using blocked region to define LHS and RHS ends. The blocked region can be changed in these modules. The default blocked region is 120° to 300°. For bay between line C3 and C6 in above example, the incline angle  $\alpha = \text{ArcTan}[(-3800)/8000] = 334.59^\circ$ . This angle is in un-blocked region and **SADS** sets line C3 as LHS end and line C6 as RHS end. For this bay, ETABS sets C3 as I-end and C6 as J-end. It is matched. For bay between line C2 and C5 in above example, the incline angle  $\alpha = \text{ArcTan}[-8000/(3800)] = 295.41.41^\circ$ . This angle is in blocked region and **SADS** sets line C5 as LHS end and line C2 is RHS end. But, ETABS sets C2 as I-end and C5 as J-end. It is reversed.

**SADS** will scan all bays and flags all bays that need to reversed.

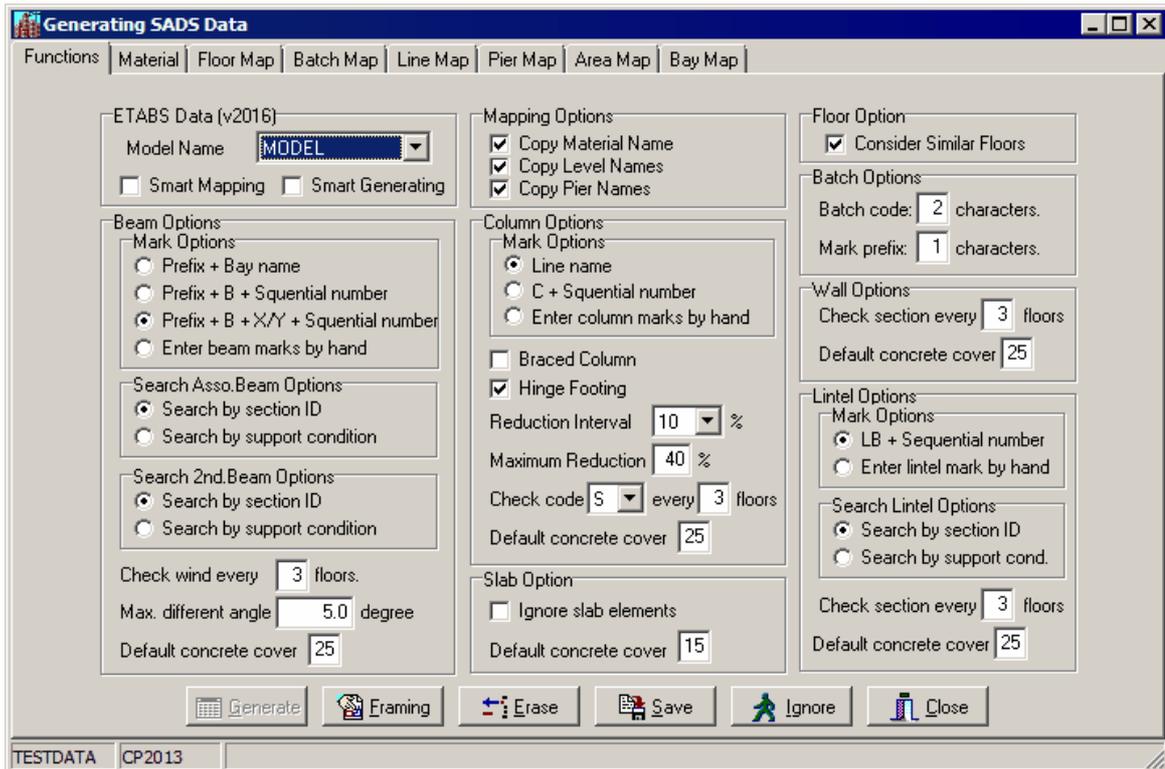
- For horizontal bay, ETABS sets the I-end to left end and J-end to right end. For example, the bay between C1 and C2, the I-end is taken at C1 and J-end is taken at C2. This is then same as **SADS**
- For vertical bay, ETABS sets the I-end to lower end and J-end to upper end. For example, the bay between C1 and C3, the I-end is taken at C3 and J-end is taken at C1. This is the same as **SADS** also.
- For diagonal bay, **SADS** is using blocked region to define LHS and RHS ends. The blocked region can be changed in these modules. The default blocked region is 120° to 300°. For bay between line C3 and C6 in above example, the incline angle  $\alpha = \text{ArcTan}[(-3800)/8000] = 334.59^\circ$ . This angle is in un-blocked region and **SADS** sets line C3 as LHS end and line C6 as RHS end. For this bay, ETABS sets C3 as I-end and C6 as J-end. It is matched. For bay between line C2 and C5 in above example, the incline angle  $\alpha = \text{ArcTan}[-8000/(3800)] = 295.41.41^\circ$ . This angle is in blocked region and **SADS** sets line C5 as LHS end and line C2 is RHS end. But, ETABS sets C2 as I-end and C5 as J-end. It is reversed.

**SADS** will scan all bays and flags all bays that need to be reversed.

### 10.3.3 Functions Page

When you choose Generate **SADS** Data from Analysis Command or click  button on

[Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Generate **SADS** Data window as below.



At the first time you enter the window, there is no mapping files in the project folder. So, the Functions page is displayed first and the Generate button in this page is disabled. The Material TAB, Floor Map TAB, Batch Map TAB and Bay Map TAB are always displayed. The Line Map TAB is displayed when there is column (line) in ETABS MDB file. The Pier Map TAB is displayed when there is wall (pier) in ETABS MDB file. The Area Map TAB is displayed when there is slab (areas) in ETABS MDB file and the Ignore slab element check box is un-checked.

#### ETABS Name Group Box :

**ETABS Name:** The ETABS name is retrieved automatically from the file name of ETABS MDB file in project data folder. If you have more than one MDB files, you may select the desired MDB file from the drop down combo box.

**Smart Mapping:** If your project is a blank project, you can un-check the check box. This check box should be checked when you are amending an existing mapping data.

**Smart Generating:** If your project data is blank, you can un-check the check box. If you have a set of useful project data, you must check the check box, otherwise, your data will be overwritten.

#### Floor Option Group Box:

**Consider Similar Floors:** If your MDB files define SimilarTo data and these data do not match your requirement, you can un-check this check box to ignore these data.

#### Batch Options:

**Batch code:** You may define the length of batch code in Floor Map Page.

**Mark Prefix:** You may define the length of mark prefix in Batch Map Page.

#### Mapping Options Group Box :

**Copy Material Name:** Check the check box if you want to use the material name as the concrete grade name.

**Copy Level Name:** Check the check box if you want to use the level names as the floor codes.

**Copy Pier Name:** Check the check box if you want to use the pier names as the wall marks.

#### Beam Options Group Box :

##### Mark Options :

**Prefix + Bay name:** SADS will generate beam marks as prefix plus the bay name in ETABS

files. The prefix is define in [Batch Map Page](#).

**Prefix + B + Sequential number:** **SADS** will generate beam marks as prefix plus character "B" plus a sequential number. The sequential numbers are sorted by positions of beams, from left to right and from lower to upper.

**Prefix + B + X/Y + Sequential Number:** **SADS** will generate the beam marks as prefix plus character "B" plus character "X" or "Y" plus a sequential number. For beam in X-X direction, "X" character is used, otherwise "Y" character is used. The sequential numbers are sorted by positions of beam also, and the numbering is separated in 2 different directions.

**Enter beam marks by hand:** You may select to generate the beam marks by entering these marks manually.

**Search Asso Beam Option:**

- **Search by section ID:** If you select this option, **SADS** verifies girder / associate beam based on the first character equal to "G" in section ID in ETABS.
- **Search by support condition:** If you select this option, **SADS** verifies girder / associate beam based on the support condition of beam.

Please select Search by section ID for this demo.

**Search 2nd Beam Option:**

- Search by section ID: If you select this option, **SADS** verifies secondary beam based on the first character equal to "S" in section ID in ETABS.
- Search by support condition: If you select this option, **SADS** verifies secondary beam based on the support condition of beam.

Please select Search by section ID for this demo.

**Check wind every XX floors:** If your project has typical floors, you may define this number. **SADS** will generate lateral loads in beam batch data.

**Max. Different Angle:** You may define a small number in the field. If 2 adjacent beams have an small angle that not greater than the defined value, **SADS** will consider these 2 beams as continuous beam.

**Default concrete cover:** The default value will apply all beams at all batches. If the concrete cover has different value a some batches, you may change in Batch Map Page.

**Column Options Group Box :**

**Mark Options :**

**Line name:** **SADS** will generate the column marks that same as line names in ETABS files.

**C + Sequential number:** **SADS** will generate column marks as character "C" plus a sequential number. The sequential numbers are sorted by positions of columns, from left to right and from lower to upper.

**Enter column marks by hand:** You may select to generate the column marks by entering these marks manually.

**Braced Column:** You may use this check box to generate braced columns or un-braced columns. This option applies to all columns.

**Hinged Footing:** You may use this check box to generate hinged footing or fixed footing columns. this option applies to all columns.

**Maximum reduction:** **SADS** will use this data to generate the imposed load reduction factors at all floor levels.

**Check code X at XX floors:** You may specify the check code you like to use (U, S, E or C). Also, you may specify interval number of floor for checking column sections.

**Default concrete cover:** The default value will apply all columns at all floors. If the concrete cover has different value a some floors, you may use Floor Data sub-command to change it.

**Slab Option:**

**Ignore slab elements:** If your MDB file contains area elements and you don't want to generate slab using these elements, you should check this check box.

**Default concrete cover:** The default value will apply all slabs at all batches. If the concrete cover has different value a some batches, you may change in Batch Map Page.

**Wall Options :**

**Check section every XX floors :** You may specify a interval number of floor for checking wall sections.

**Default wall cover :** The default value will apply all walls at all floors. If the concrete cover has different value a some floors, you may use Floor Data sub-command to change it.

#### Lintel Options:

##### Mark Options:

**LB+Sequential number:** **SADS** will generate lintel marks as characters "LB" plus a sequential number. The sequential numbers are sorted by positions of lintels, from left to right and from lower to upper.

**Enter lintel mark by hand:** You may select to generate the beam marks by entering these marks manually.

##### Search Lintel Option:

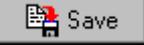
- **Search by section ID:** If you select this option, **SADS** defines secondary beam based on the first character equal to "LS" in section ID in ETABS.
- **Search by support condition:** If you select this option, **SADS** defines secondary beam based on the support condition of beam.

**Check section every XX floors :** You may specify a interval number of floor for checking lintel sections.

**Default concrete cover :** The default value will be used to generate lintel beam data.

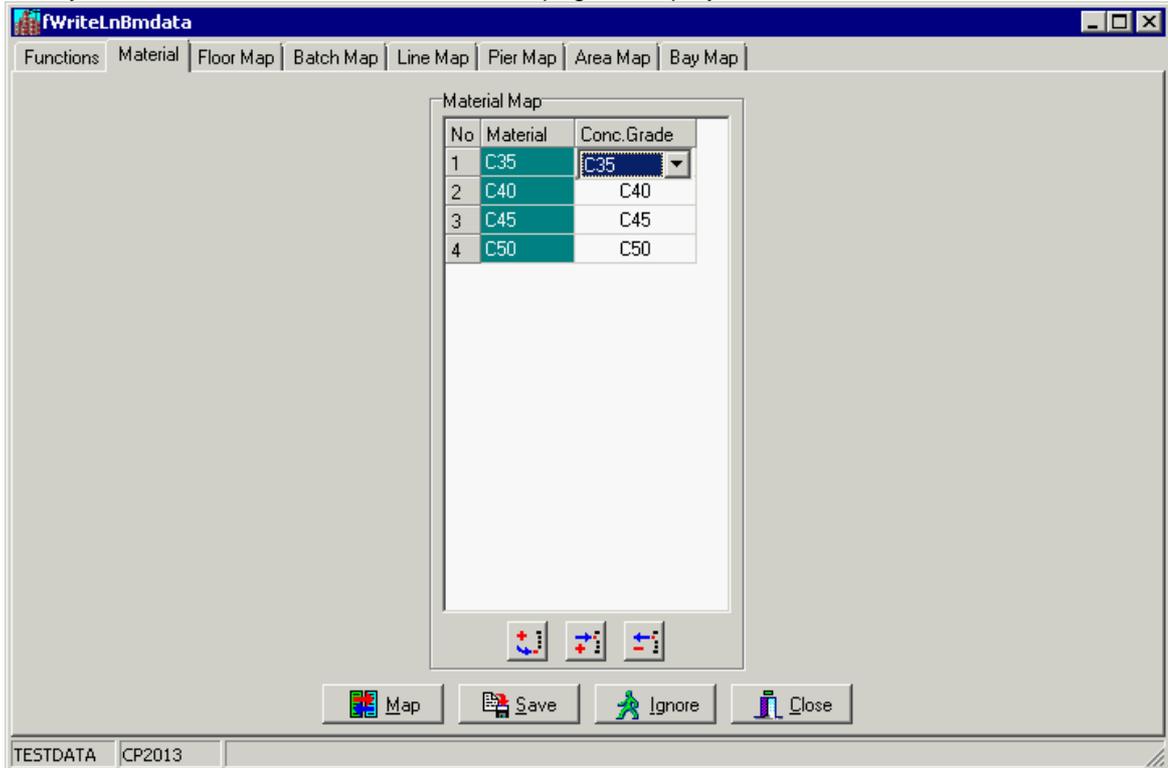
After you have selected all options, you must click the Save button and click the map page in sequence of Material page, Floor Map page, Batch Map page, Line Map page (if any), Pier Map page (if any), Area Map page (if any) and Bay Map page.

The function of the following buttons are described as below:

- |   |   |
|---|---|
|    | - Click it to generate SADS data using ETABS output data.                                     |
|   | - Click it to display framing plan of building and will be <a href="#">explained latter</a> . |
|  | - Click it to erase the map data of current ETABS MDB file.                                   |
|  | - Click it to save the settings in this window.   |
|  | - Click it to ignore the changes of the settings and restore to the previous values.          |
|  | - Click it to close the window..  |

### 10.3.4 Material Page

After you click the Material TAB, the Material page is displayed as below.



If the grid is blank or you have changed the material data in ETABS MDB file, you can click the Map button to get the updated map data.

**Material** - This field is retrieved from ETABS MDB file.

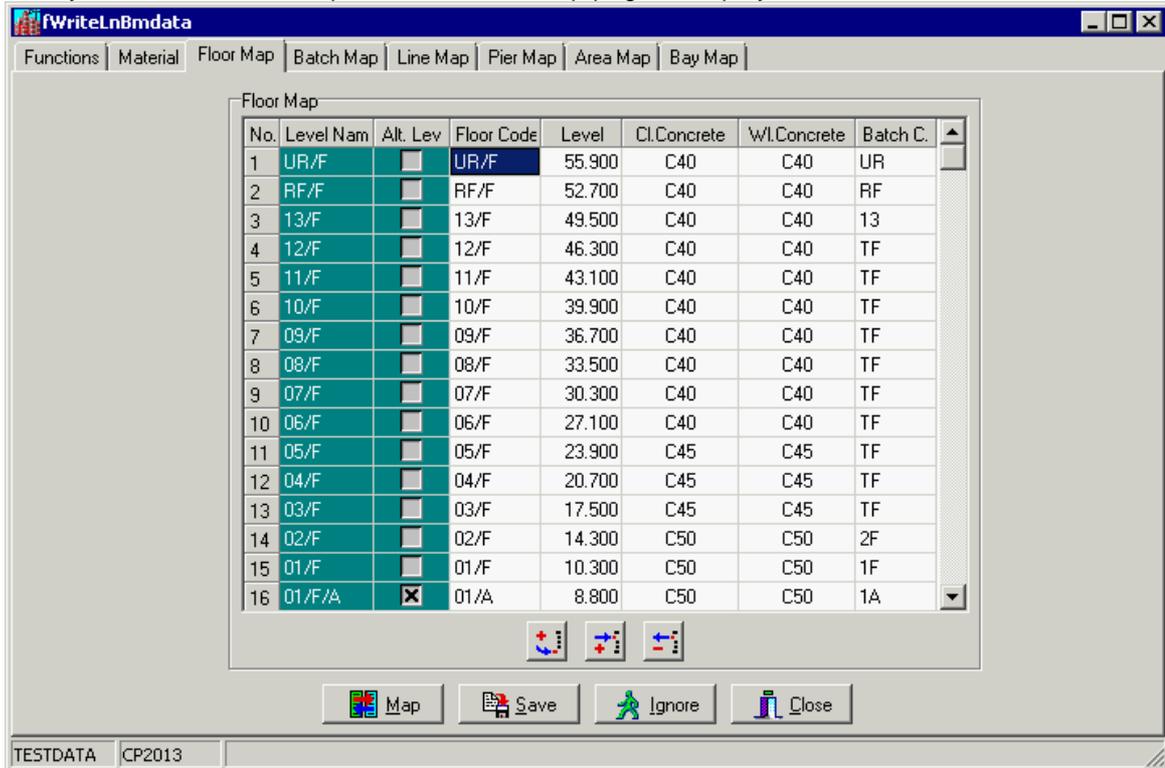
**Conc. Grade** - The name of mapped concrete grade in **SADS**.

If there are some redundant data, you may use the  speed button to delete them.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.5 Floor Map Page

After you click the Floor Map TAB, the Floor Map page is displayed as below.



If the grid is blank or you have changed the level data in ETABS MDB file, you can click the Map button to get the updated map data.

#### Floor Map Grid :

**Level Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Alt. Lev:** The alternative level name that generated by **SADS** for points that the DZBelow > 0. This field is read only.

**Floor Code:** If you checked the Copy Level name check box in function page, **SADS** will copy the level names to floor code field. You need not to enter the floor codes manually.

**Level:** The data in the field are retrieved from ETABS files.

**Cl. Concrete:** The concrete grade for columns. The value is mapped by **SADS**. You may change the value if you find this value is not correct.

**Wl. Concrete:** The concrete grade for walls. The value is mapped by **SADS**. You may change the value if you find this value is not correct.

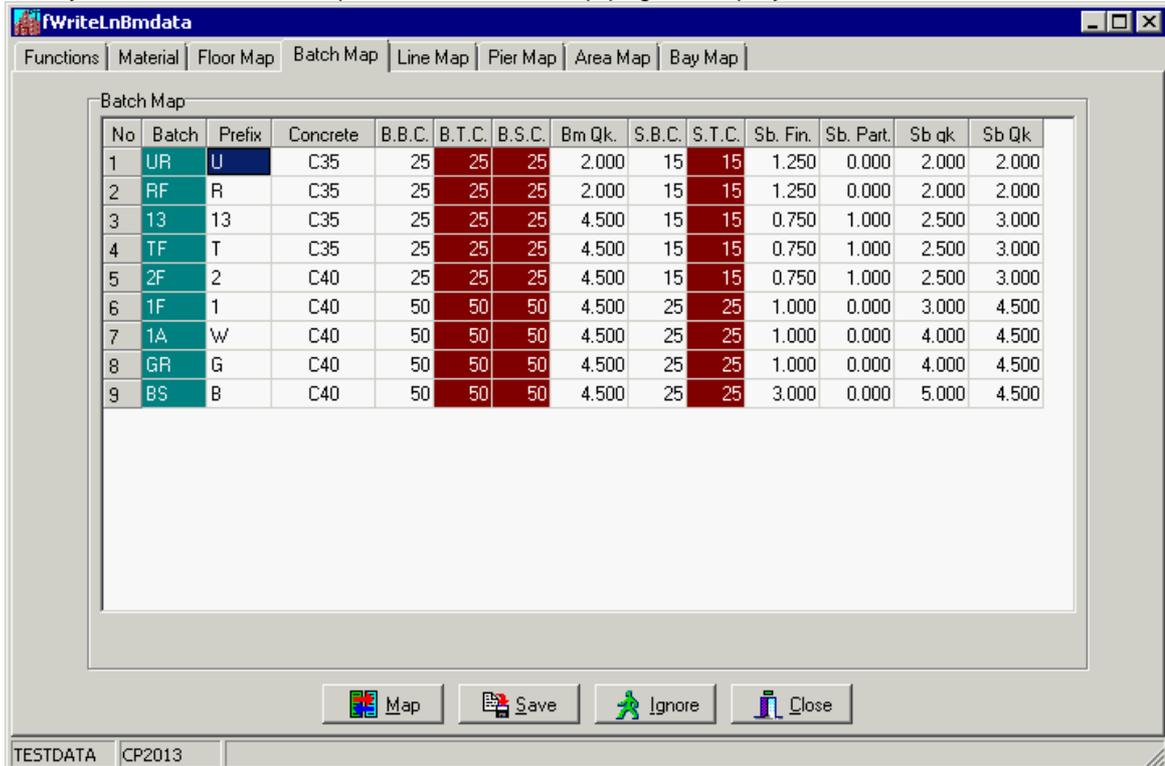
**Batch C.:** The batch code for slabs and beams. There is no related data in the ETABS files. You should enter these data manually.

You may use the Insert button  to insert a new row and Delete button  to delete the highlighted row. In most cases, the map data retrieved from MDB file are correct. You should use these 2 buttons carefully.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.6 Batch Map Page

After you click the Batch Map TAB, the Batch Map page is displayed as below.



If the grid is blank or you have changed the batch code in [Floor Map page](#), you can click the Map button to get the updated map data.

#### Batch Map Grid :

**Batch:** The batch codes is input from Floor Map Page. This field is read only.

**Prefix:** The prefix of beam marks and slab marks.

**Concrete:** The concrete grade for slabs and beams. The value is mapped by **SADS**. You may change the value if you find this value is not correct.

**B.B.C:** The beam concrete cover at bottom of section, unit: mm.

**B.T.C:** The beam concrete cover at top of section, unit: mm. If you don't select Multiple concrete cover check box in Master Data, this field is disabled.

**B.S.C:** The beam concrete cover at side of section, unit: mm. If you don't select Multiple concrete cover check box in Master Data, this field is disabled.

**B.Min.LL:** The minimum imposed load on beam, unit: kN.

**S.B.C:** The slab concrete cover at bottom of section, unit: mm.

**S.T.C:** The Slab concrete cover at top of section, unit: mm. If you don't select Multiple concrete cover check box in Master Data, this field is disabled.

**Sb Fin.:** The finish weight of slab, unit: kN/M<sup>2</sup>.

**Sb Part.:** The partition weight of slab, unit: kN/M<sup>2</sup>.

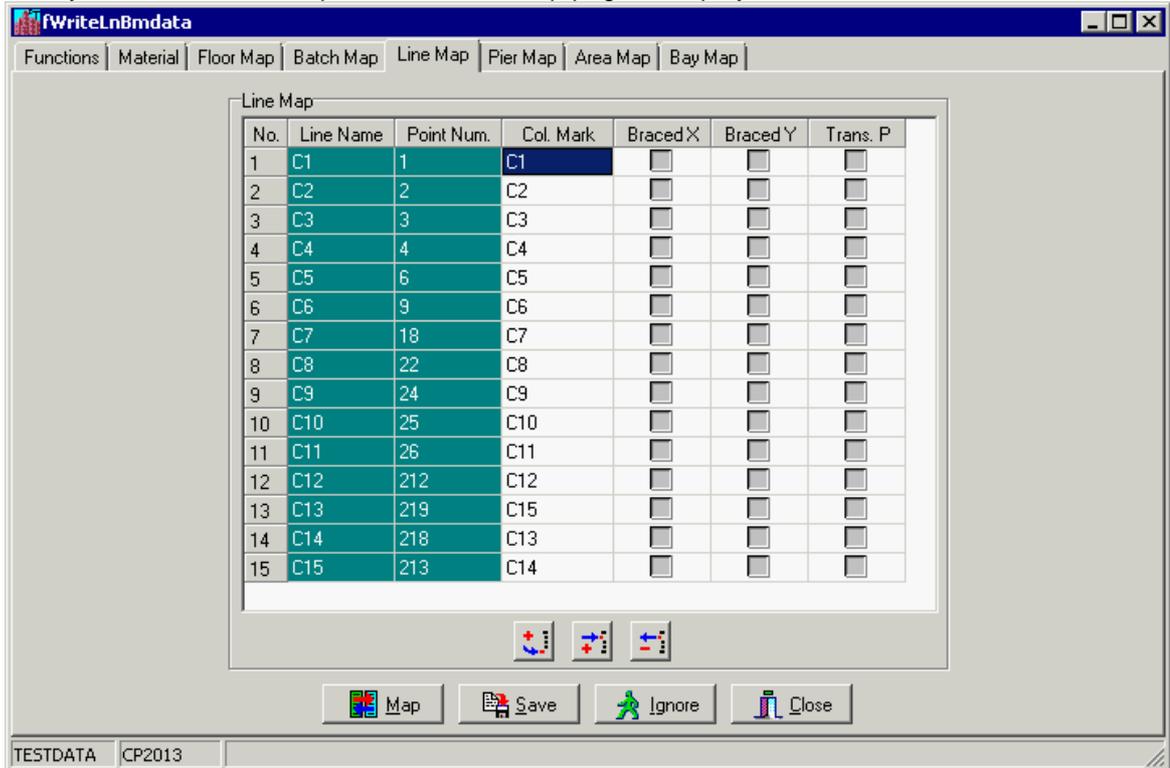
**Sb Live:** The imposed load of slab, unit: kN/M<sup>2</sup>.

**S.Min.LL:** The minimum imposed load on slab, unit: kN/M.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.7 Line Map Page

After you click the Line Map TAB, the Line Map page is displayed as below.



If the grid is blank or you have changed the line data in ETABS MDB file, you can click the Map button to get the updated map data.

#### Line Map Grid :

**Line Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Point Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Col.Mark:** The column marks for **SADS** database. If you select Enter column mark by hand option in Function page, the field is blank and you should enter the column marks manually. Otherwise, **SADS** will generate column marks according with your option in Function page.

**Braced X and Braced Y:** If you checked the Braced Column check box in Function page, the Braced X and Braced Y are checked. Otherwise, they are un-checked. You may change the status for some specific columns if it is necessary.

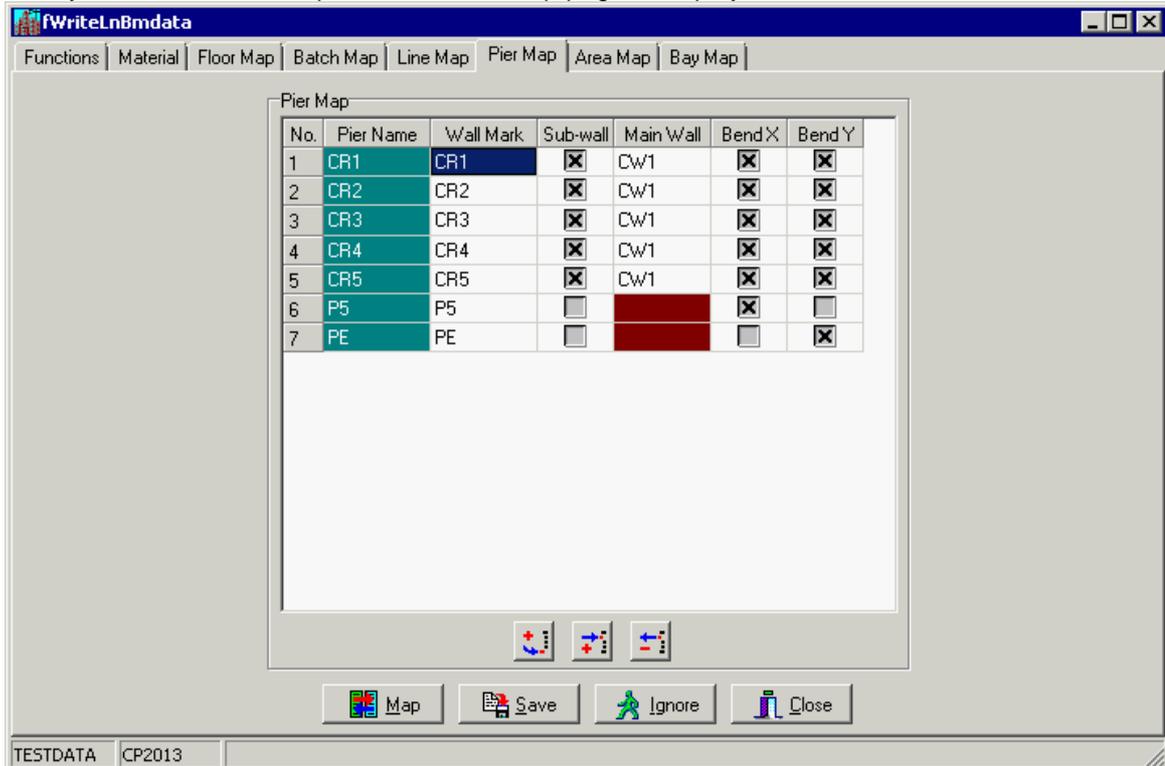
**Trans. P:** If there is a transferred plate on the top of column, the check box is checked, otherwise, it is un-checked.

For the Insert and Delete button, please refer to [Floor Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.8 Pier Map Page

After you click the Pier Map TAB, the Pier Map page is displayed as below.



If the grid is blank or you have changed the pier data in ETABS MDB file, you can click the Map button to get the updated map data.

#### Pier Map Grid :

**Pier Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Wall Mark:** The wall marks for **SADS** database. If you checked the Copy Pier Name check box in Function page, **SADS** will generate wall mark based on the pier names. Otherwise, you should enter the wall marks manually.

**Sub-wall:** If the pier (wall) is a sub-wall in **SADS**, you should check the check box.

**Main wall:** After you check the Sub-wall check box, the status of Main Wall field will be changed to available. You should enter the mark of main wall for this pier (wall).

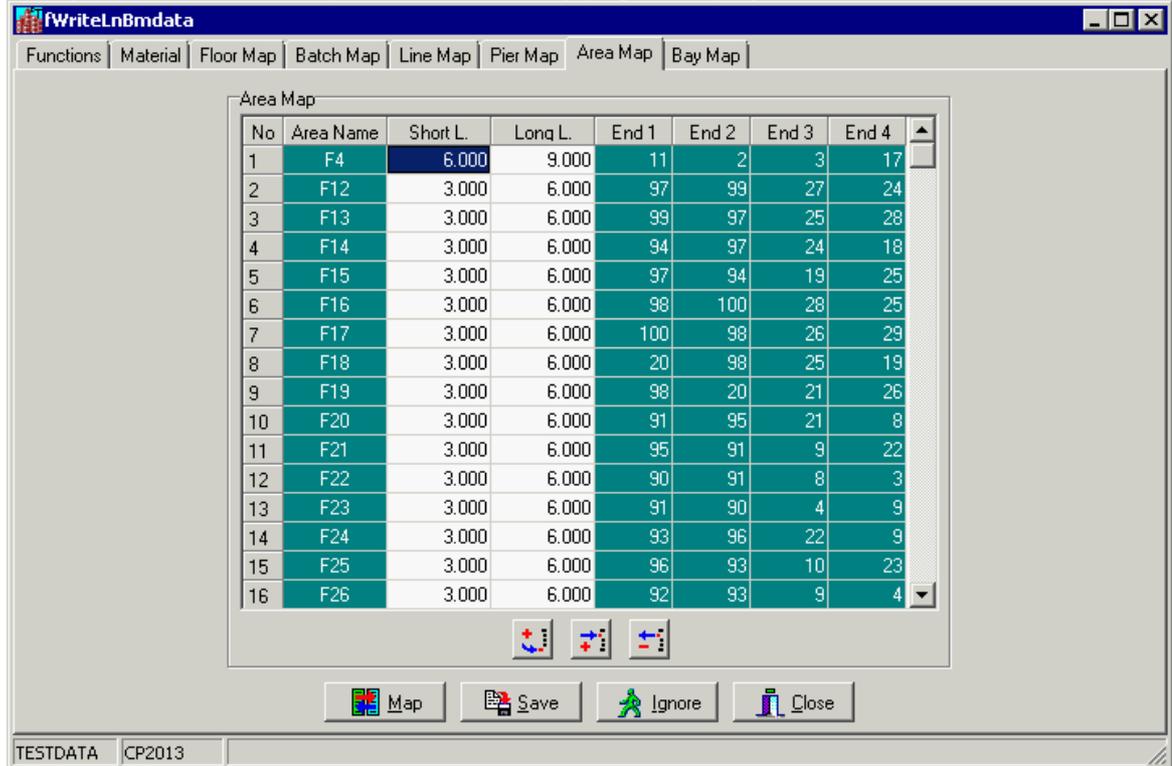
**Bend X and Bend Y:** these 2 fields are corresponding to Bending Along X and Bending Along Y in Wall Data sub-command. The default of these fields are set to true (checked). You may change the values for shear walls that the moments along minor axis are neglect able.

For the Insert and Delete button, please refer to [Floor Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.9 Area Map Page

After you click the Area Map TAB, the Area Map page is displayed as below.



If the grid is blank or you have changed the area data in ETABS MDB file, you can click the Map button to get the updated map data.

#### Area Map Grid :

**Area Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Short L:** The short span of slab. When the area is rectangle, this span is calculated based on nodes of area. You may adjust this span to the actual length of span. If the area is not rectangle, you should provide the span to the grid.

**Long L:** The long span of slab. When the area is rectangle, this span is calculated based on nodes of area. You may adjust this span to the actual length of span. If the area is not rectangle, you should provide the span to the grid.

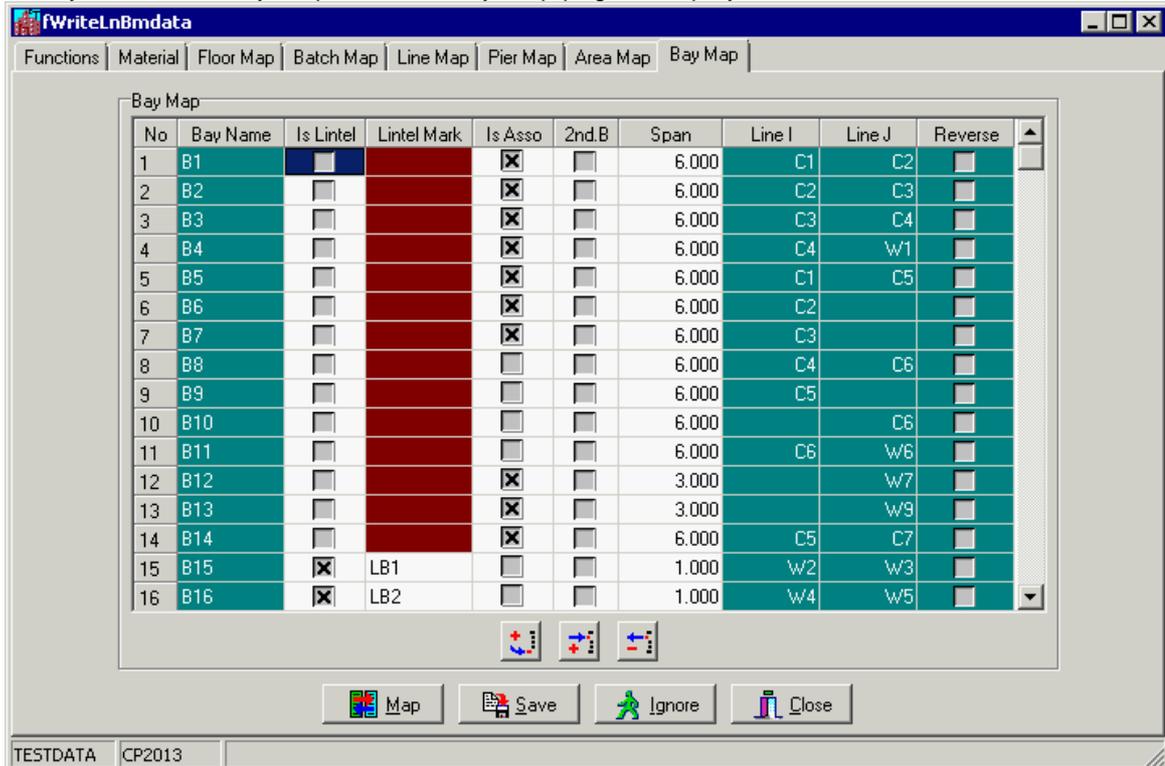
**End1, End2, End3 & End4:** The point names at corners of area. These data are retrieved from ETABS files. These fields are read only.

For the Insert and Delete button, please refer to [Floor Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.3.10 Bay Map Page

After you click the Bay Map TAB, the Bay Map page is displayed as below.



If the grid is blank or you have changed the bay data in ETABS MDB file, you can click the Map button to get the updated map data.

#### Bay Map Grid :

**Bay Name:** The data in the field are retrieved from ETABS files. This field is read only.

**Is Lintel:** If you check the Auto search lintel beam check box in Function Page, **SADS** checks or un-checks these check boxes for you. Otherwise, you should check or un-check these check boxes manually.

**Lintel Mark:** If the auto search is selected and you select 'LB'+Sequential number in mark option, the lintel mark will be generated automatically. If not, you should enter the mark of the lintel beam manually.

**Is Asso.:** If you check the Auto search associate beam check box in Function Page, **SADS** checks or un-checks these check boxes. If the associate beams cannot be verified by search function, **SADS** prints a report and ask you to define those beams by yourself.

**2nd.B.:** The secondary beams may have duplicated marks. In this case, auto generate beam mark cannot work properly. Also, the secondary beams are not carrying lateral load in **SADS**; the lateral forces should not be imported from ETABS file to **SADS** database. So, you need to check these boxes if the beams are secondary beams.

**Line I and Line J:** The line names at both end of bays. These data are retrieved from ETABS files. These fields are read only.

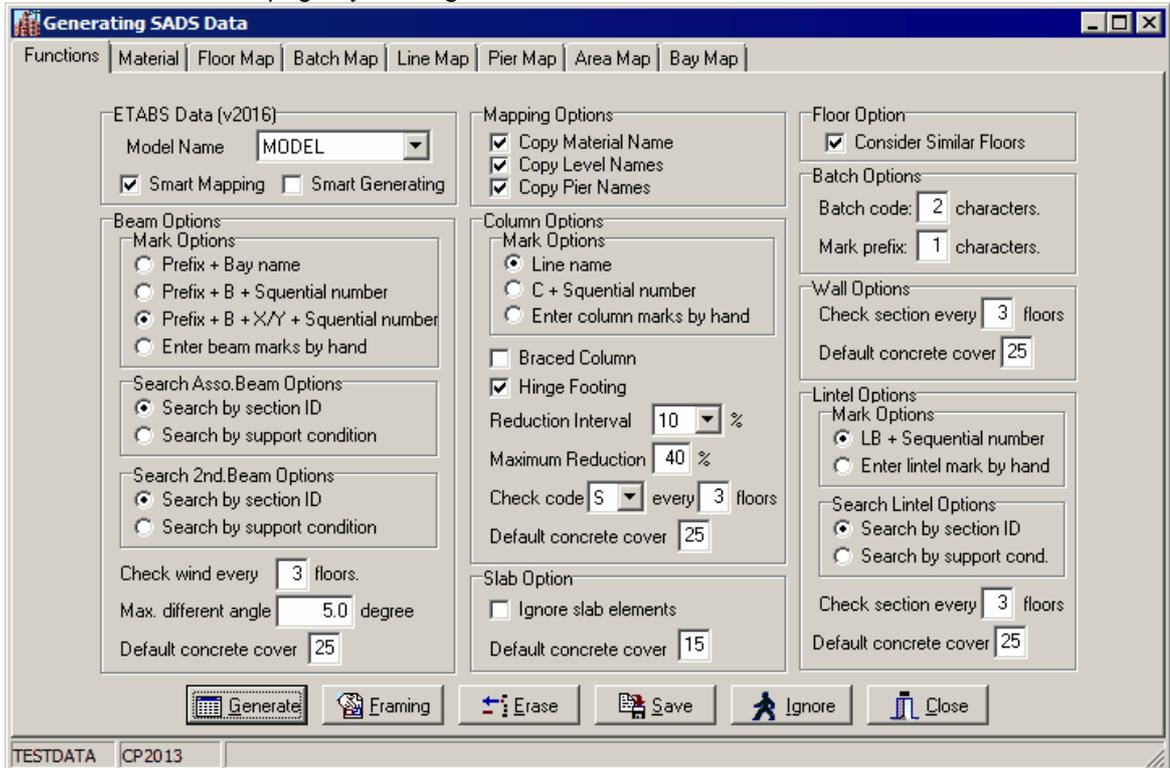
**Revs.:** **SADS** assumes that the end I is located at the left hand side of beam in X-X direction and at lower end of beam in Y-Y direction. If it is not true, **SADS** will set the reverse field to true, i.e. the end condition is reversed. The values of the field are searched by **SADS** and set the field to read only.

For the Insert and Delete button, please refer to [Floor Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing. If you click Save button, **SADS** will display Framing Plan window for editing beam map data. The functions of Framing Plan window will be explain in Display Framing Plan topic.

### 10.3.11 Generating Data

After you have completed the mapping process and have reviewed the framing plan, you may return to the Function page by clicking Function TAB.



You may notice that the Generate button is enabled. This change indicates the mapping is done and you can start to generate **SADS** data using ETABS MDB file.

Before you generate **SADS** data, you must set a correct Smart Generating option. If the **SADS** database is blank, you can un-check the check box. If you already have a usable **SADS** data, you must check the Smart generating check box. **SADS** will reserve all usable data when generating data. After this option is set correctly, you can simply click the Generate button and check the generated **SADS** data listed in [Overview](#) topic.

## 10.4 Link ETABS Data Sub-command

### 10.4.1 Overview

The Link ETABS Data sub-command is good when you have input both **SADS** data and ETABS data. It is more easy to understand. But, it need you to waste more time and effort to prepare both **SADS** and ETABS data, and create the mapping between these 2 data sets. Using the link, **SADS** can import the forces of beams, columns and walls from ETABS MDB output file to **SADS** database. Furthermore, **SADS** can update the section properties in ETABS e2k input file based on the sections of beams, columns and walls that stored in **SADS** database. The sub-command does not attempt to create a whole ETABS e2k input file.

Before you use this sub-command, you should complete the following work.

1. Prepare a complete **SADS** project data and validate this project data
2. Prepare a valid ETABS MDB output file and e2k input file.
3. Copy ETABS MDB output files and ETABS e2k input files to **SADS** project data folder.

There two part in the sub-command.

1. Mapping ETABS data with **SADS** data.
2. Processing ETABS data.

The mapping section needs MDB Access file that contains tables listed in the previous topic.

The Updating ETABS input file (e2k) function relies the remark lines in ETABS e2k input file. If you are using ETABS 7~9 and export the e2k file, the similar remark lines are inserted properly. If you prepare the ETABS input file by yourself, or you change the remark lines in generated input file, you must make sure the following keywords is included in remark lines of following data sections.

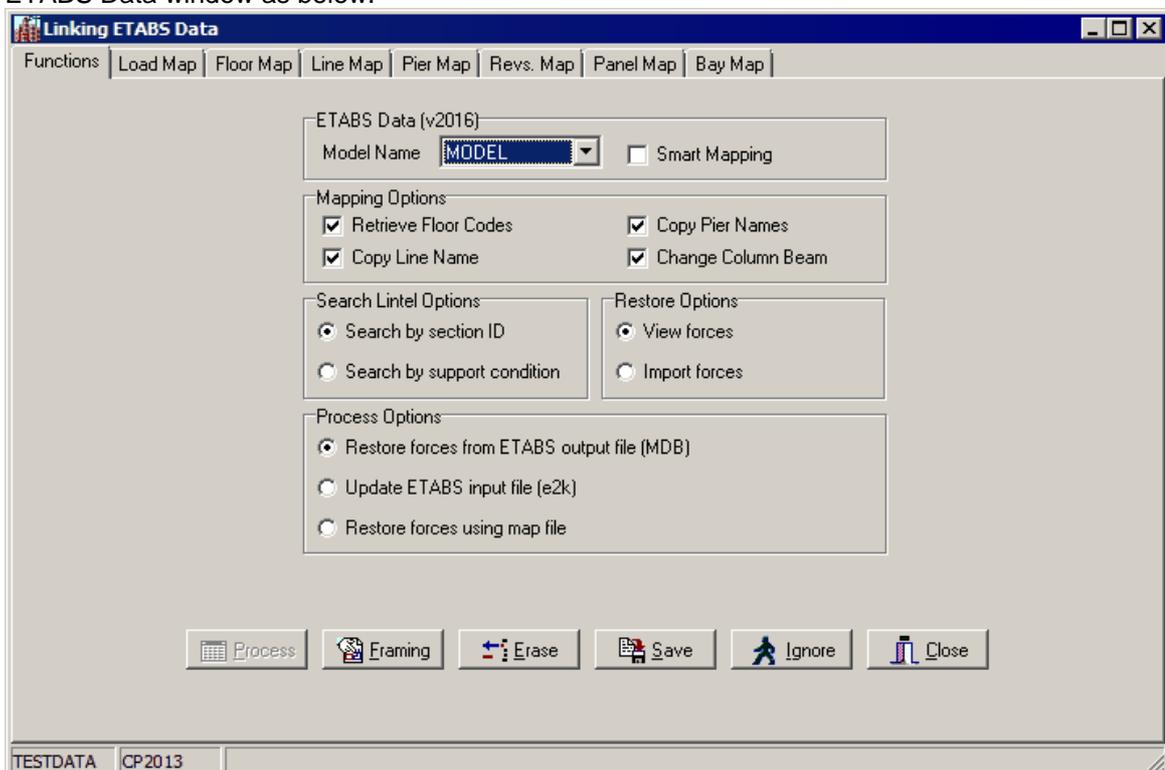
Data section	Keyword
Story section	STORIES
Material property section	MATERIAL PROPERTIES
Frame sections section	FRAME SECTIONS
Wall/slab/deck property section	WALL/SLAB/DECK PROPERTIES
Pier/spandrel name section	PIER/SPANDREL NAMES
Line connectivity section	LINE CONNECTIVITIES
Line assignment section	LINE ASSIGN
Area assignment section	AREA ASSIGN
Static load section	STATIC LOADS

The keywords are case insensitive.

The Link ETABS Data sub-command uses the same map data with [Generate SADS Data](#) sub-command. If you have generated **SADS** data with this sub-command, the mapping section is done, except the load case mapping. You can go to [Load map page](#) to finish the load case mapping and go to [process section](#) directly.

## 10.4.2 Functions Page

When you choose Link ETABS Data from Analysis Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Link ETABS Data window as below.



At the first time you enter the window, there is no mapping files in the project folder. So, the Functions page is displayed first and the Process button in this page is disabled. The Load Map page, Floor Map page and Bay Map page are always displayed. The Line Map page is displayed

when there is column (line) in ETABS MDB file. The Pier Map page, Revs. Map page and Panel Map page are displayed when there is wall (pier) in ETABS MDB file.

**ETABS Model:**

**ETABS Name:** The ETABS name is retrieved automatically from the file name of ETABS MDB file in project data folder. If you have more than one MDB files, you may select the desired MDB file from the drop down combo box.

**Smart Mapping:** If your project is a blank project, you can un-check the check box. This check box should be checked when you are amending an existing mapping data.

**Mapping Options Group Box :**

**Retrieve Floor Codes:** If the floor structure of ETABS is the same as **SADS**, you may check the check box. Same floor structure does not mean that the level names of ETABS the same as the floor codes of **SADS**. For example, the floors in both ETABS and **SADS** from lower to upper are lower ground, ground floor, 1st. floor, 2nd. floor, etc. The level names in ETABS are L/GF, GR/F, 01/F, 02/F, etc. The floor codes in **SADS** are L/FL, G/FL, 1/FL, 2/FL, etc. You may consider the floor structures are the same and check the check box.

**Copy Line Name:** If you follow the recommendation in [Recommendation topic](#), all line names are same as the column marks in the project, you may check the check box. Otherwise, you should not check the check box.

**Copy Pier Name:** If you follow the recommendation in [Recommendation topic](#), all pier names are same as the wall marks in the project, you may check the check box. Otherwise, you should not check the check box.

**Change Column Beam:** When linking ETABS data, **SADS** can check the column beam data that input by users. If you check the check box, **SADS** will correct any error in column beam data.

**Search Lintel Option:**

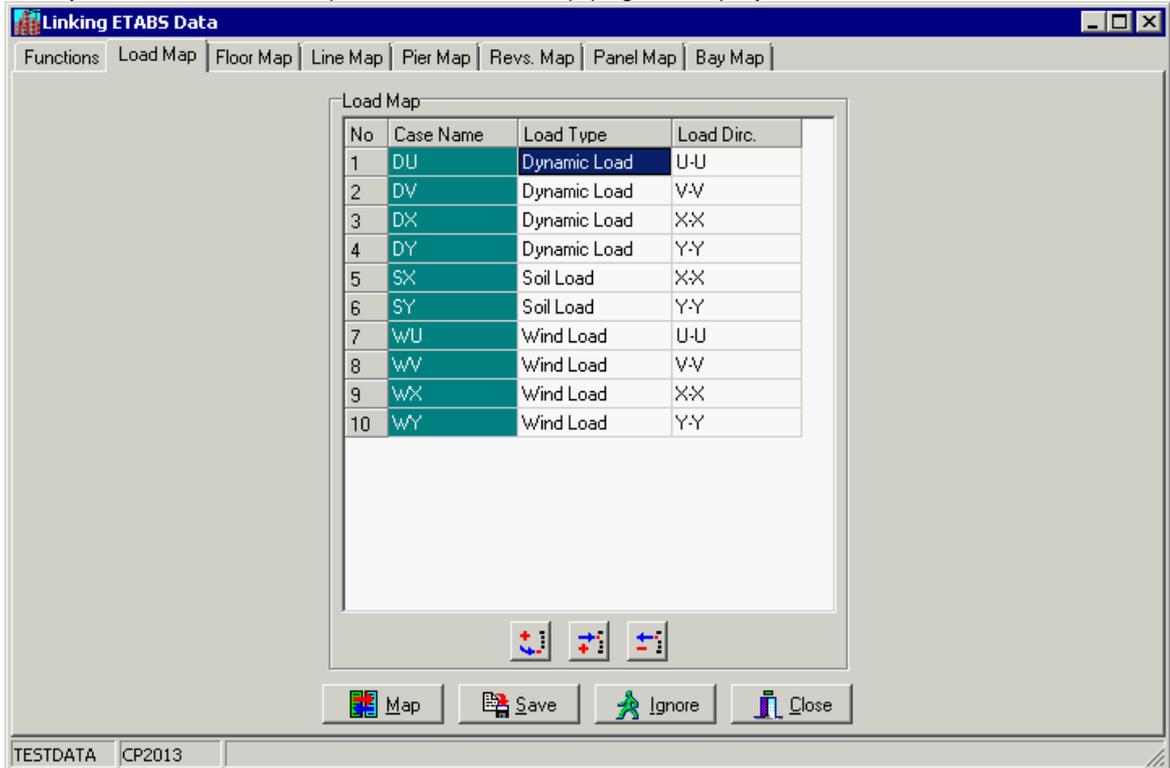
- **Search by section ID:** If you select this option, SADS defines secondary beam based on the first character equal to "LS" in section ID in ETABS.
- **Search by support condition:** If you select this option, SADS defines secondary beam based on the support condition of beam.

The Restore Options and Process Options will be explain in [Processing](#) topic.

After you set all options properly, you must click the Save button and click the map page in order of Load Map page, Floor Map page, Line Map page (if any), Pier Map page (if any) and Bay Map page.

### 10.4.3 Load Map Page

After you click the Load Map TAB, the Load Map page is displayed as below.



If the grid is blank or you have changed the load combination data in ETABS MDB file, you can click the Map button to get the updated map data

#### Load Cases Grid :

**Case Name:** The name of load case that retrieved from ETABS files.

**Load Type:** The type of load, wind load, dynamic load or lateral soil load.

**Load Dirc.:** The flag of direction of lateral load.

If you want to insert a new data in front of the existing data, you may highlight the existing one and

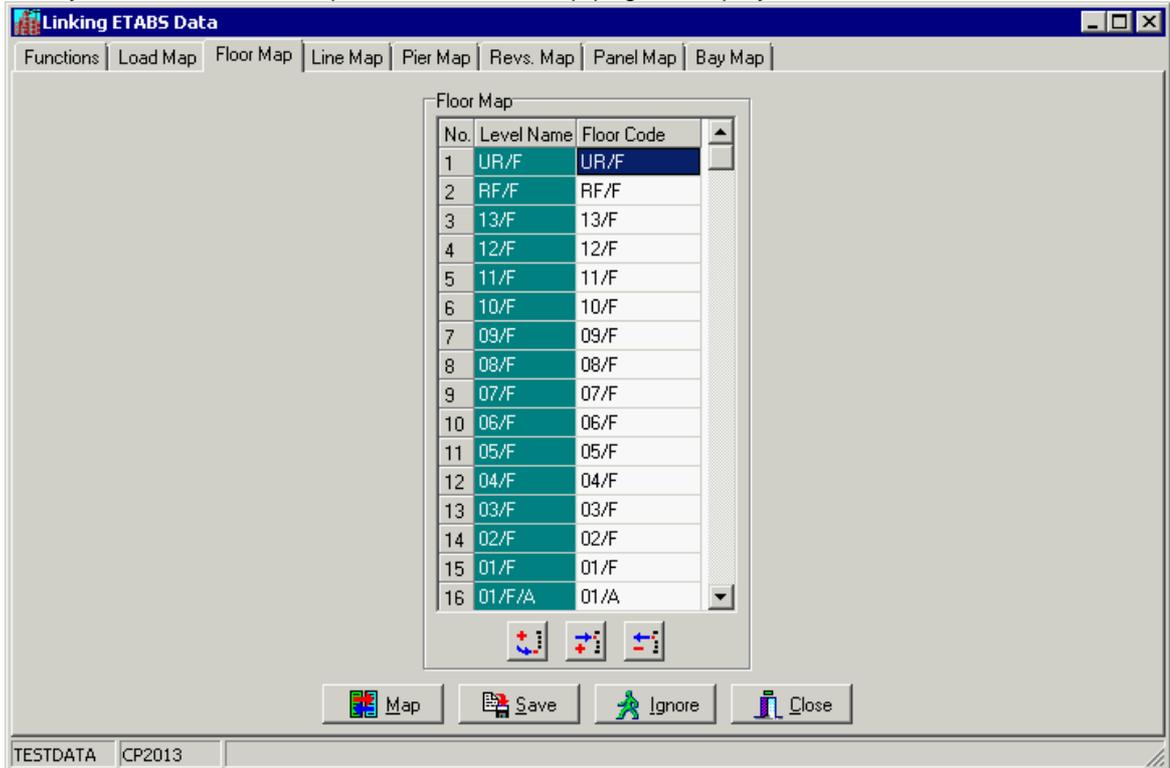
click  key, **SADS** will provide a row enable you to insert a new bay data. If you want to delete

an existing data, highlight the data and click  key, **SADS** will then delete the highlighted data.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.4.4 Floor Map Page

After you click the Floor Map TAB, the Floor Map page is displayed as below.



If the grid is blank or you have changed the level data in ETABS MDB file, you can click the Map button to get the updated map data

#### Floor Map Grid:

**Level Name:** The level names are automatically retrieved from input file of ETABS and the field is set to read only.

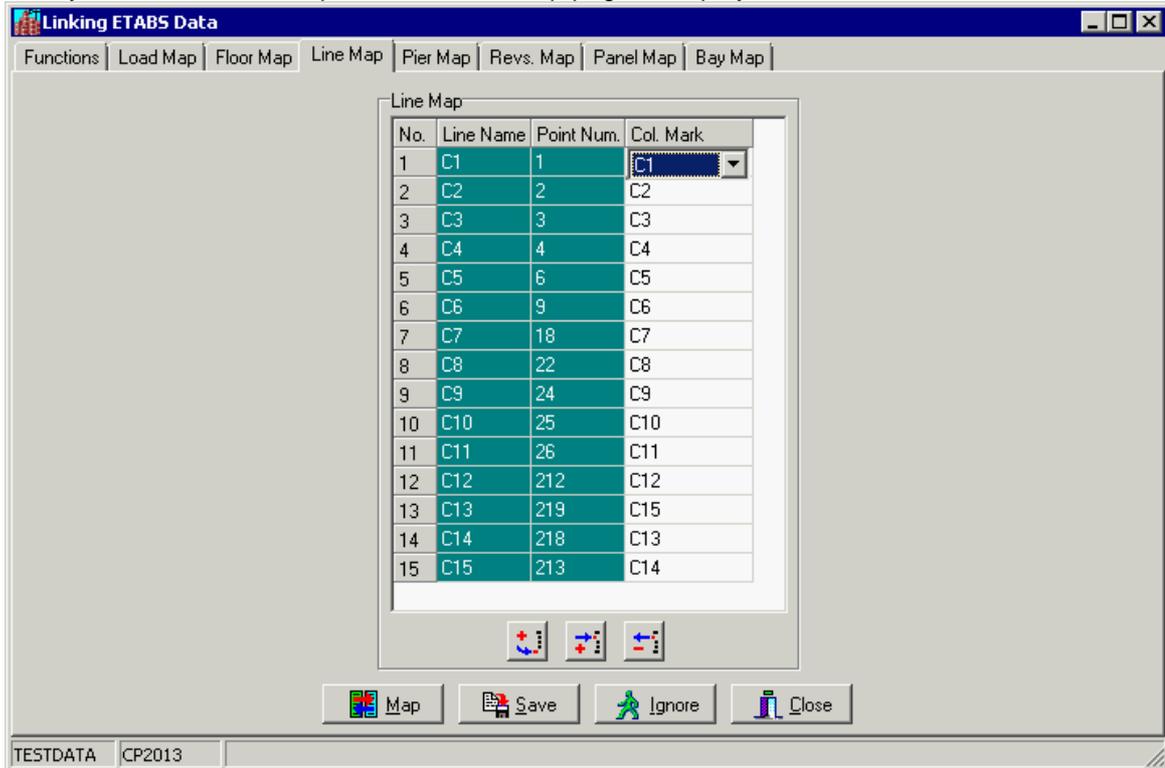
**Floor Code:** If you checked the Retrieve Floor Codes check box in function page, **SADS** will retrieve the floor codes based on the location of level names and assign to the grid. You need not to enter the floor codes manually. Otherwise you should enter the valid floor codes.

For the Insert and Delete button, please refer to [Load Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.4.5 Line Map Page

After you click the Line Map TAB, the Line Map page is displayed as below.



If the grid is blank or you have changed the line data in ETABS MDB file, you can click the Map button to get the updated map data

#### Line Map Grid :

**Line Name:** The line names are automatically retrieved from input file of ETABS and the field is set to read only.

**Point Num.:** Same as Line Name that retrieved from input file of ETABS.

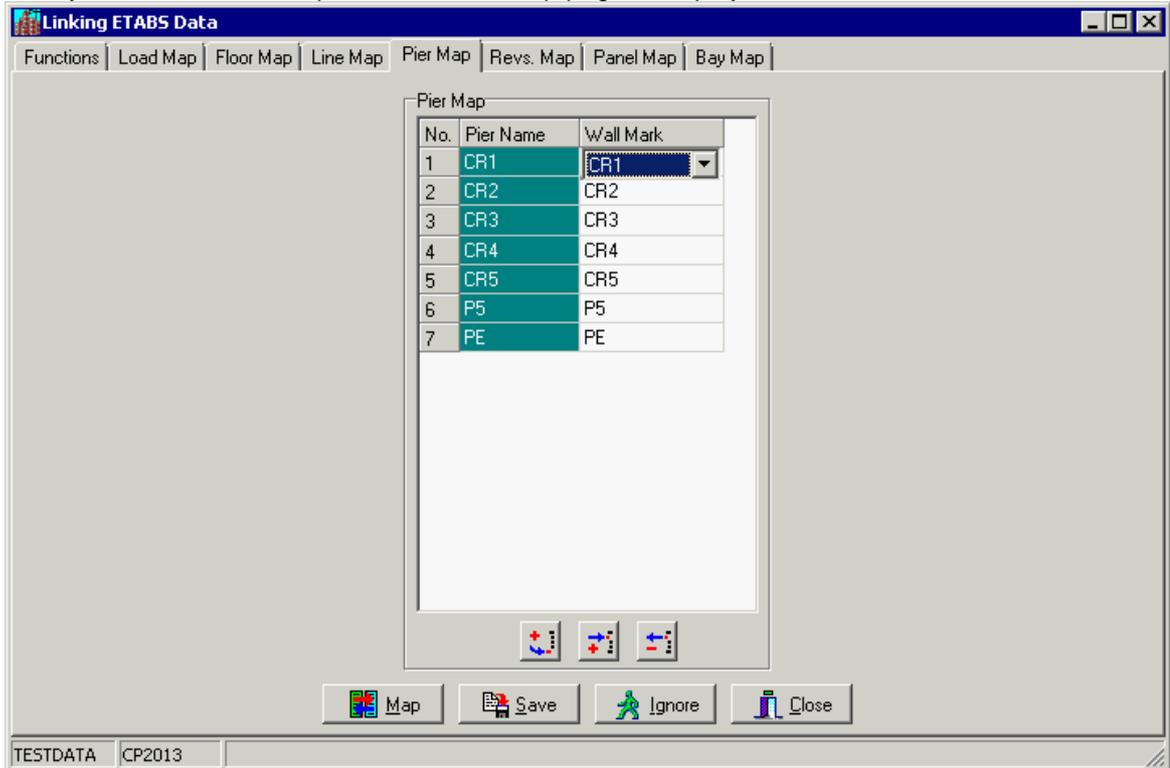
**Col. Mark:** If you checked the Copy Line Name check box in Function page, **SADS** will copy the line names to Col. Mark field. You need not to enter the column marks manually. Otherwise you should enter the valid column marks.

For the Insert and Delete button, please refer to [Load Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 10.4.6 Pier Map Page

After you click the Pier Map TAB, the Pier Map page is displayed as below.



If the grid is blank or you have changed the pier data in ETABS MDB file, you can click the Map button to get the updated map data

#### Pier Map Group Box:

**Pier Name:** The pier names are automatically retrieved from input file of ETABS and the field is set to read only.

**Wall Mark:** If you checked the Copy Pier Name check box in Function page, **SADS** will copy the pier names to Wall Mark field. You need not to enter the wall marks manually. Otherwise you should enter the valid wall marks.

For the Insert and Delete button, please refer to [Load Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 10.4.7 Reverse Map Page

After you click the Revs. Map TAB, the Revs. Map page is displayed as below.

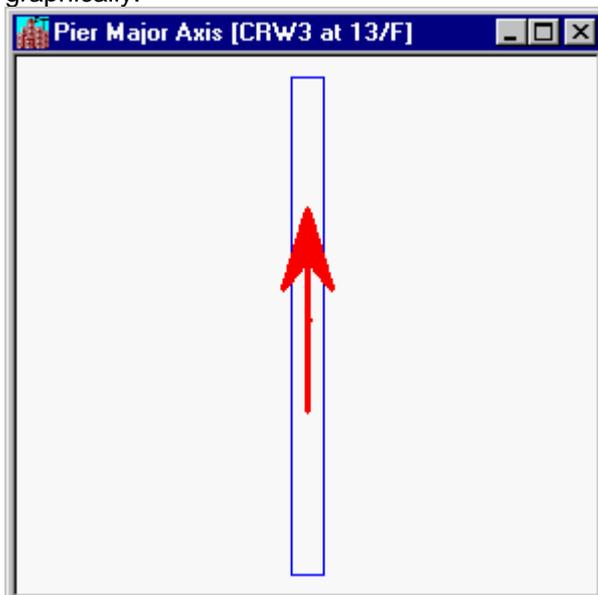
Pier Reverse Map							
Floor	CR1	CR2	CR3	CR4	CR5	P5	PE
UR/F	1	1	2	2	2	1	2
RF/F	1	1	2	2	2	1	2
13/F	1	1	2	2	2	1	2
12/F	1	1	2	2	2	1	2
11/F	1	1	2	2	2	1	2
10/F	1	1	2	2	2	1	2
09/F	1	1	2	2	2	1	2
08/F	1	1	2	2	2	1	2
07/F	1	1	2	2	2	1	2
06/F	1	1	2	2	2	1	2
05/F	1	1	2	2	2	1	2
04/F	1	1	2	2	2	1	2
03/F	1	1	2	2	2	1	2
02/F	1	1	2	2	2	1	2
01/F	1	1	2	2	2	1	2
01/F/A							

Save Ignore Close

You can use the reverse map data to check the matching of major director of pier with the SADS wall data. The direction number indicates the direction of major axis as below.

- 1 - the direction is from left to right.
- 2 - the direction is from bottom to top.
- 3 - the direction is from right to left.
- 4 - the direction is from top to bottom.

You can select one of the panel and click the Show button  to display the matching graphically.



You can change the direction number if you find the direction of major axis does not match with **SADS** wall direction.

### 10.4.8 Panel Map Page

After you click the Panel Map TAB, the Panel Map page is displayed as below.

Floor	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12
UR/F	Maroon	200	200	200	200	200	200	Maroon	200	200	200	200
RF/F	200	200	200	200	200	200	200	200	200	200	200	200
13/F	200	200	200	200	200	200	200	200	200	200	200	200
12/F	200	200	200	200	200	200	200	200	200	200	200	200
11/F	200	200	200	200	200	200	200	200	200	200	200	200
10/F	200	200	200	200	200	200	200	200	200	200	200	200
09/F	299	225	225	225	225	225	225	225	225	225	225	225
08/F	299	225	225	225	225	225	225	225	225	225	225	225
07/F	299	225	225	225	225	225	225	225	225	225	225	225
06/F	299	225	225	225	225	225	225	225	225	225	225	225
05/F	250	250	250	250	250	250	250	250	250	250	250	250
04/F	250	250	250	250	250	250	250	250	250	250	250	250
03/F	250	250	250	250	250	250	250	250	250	250	250	250
02/F	250	250	250	250	250	250	250	250	250	250	250	250
01/F	250	250	250	250	250	250	250	250	250	250	250	250

There are 4 colors in the grid.

**White** - The panel in the grid is exist, but it is not linked to **SADS** wall element. You can manually change the thickness if it is changed in [wall section data](#).

**Yellow** - The panel in the grid is exist and linked to **SADS** wall element. When you change the thickness of wall element in [Maintain Wall Data](#) Sub-command, the thickness in the grid is synchronized automatically. The thickness is locked for security.

**Aqua** - If you define 2 or more panels located in the same position, **SADS** can't handle this case and shows with this color. You must fix this problem in ETABS. It is a rare error case.

**Maroon** - There is no panel in this position.

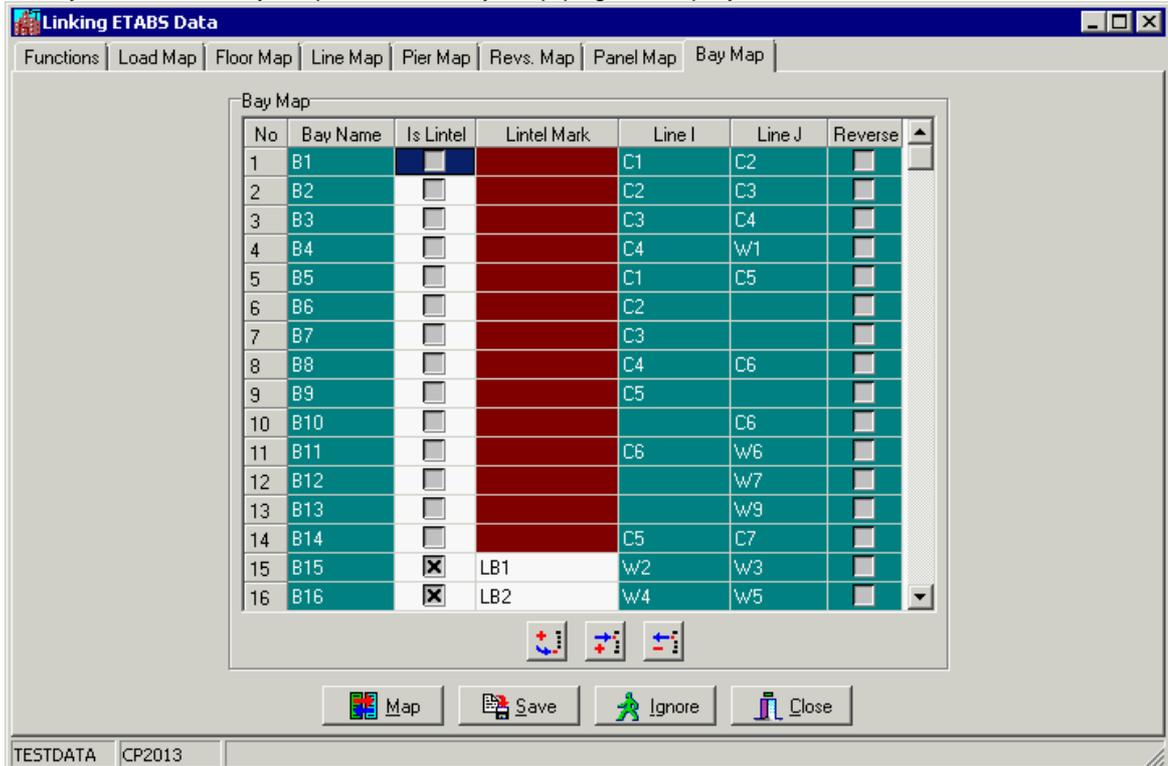
If you are using Generate **SADS** Data Sub-command to create the project data, the linking between panels in ETABS and wall section elements in SADS is created automatically. If all the **SADS** wall data are prepared by keyboard entry, this linking do not be generated. You can do the following procedure.

1. You can click the Map button in the screen. **SADS** will scan the positions of panels and wall section elements and find the matching of the 2 sets of objects. Then, **SADS** assigns the panel name to panel field in [wall section](#) automatically.
2. You can find the matching of panel and wall section elements by yourself and assign the panel name to wall section manually.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 10.4.9 Bay Map Page

After you click the Bay Map TAB, the Bay Map page is displayed as below..



If the grid is blank or you have changed the bay data in ETABS MDB file, you can click the Map button to get the updated map data

### Bay Name Grid :

**Bay Name:** The line names are automatically retrieved from input file of ETABS and the field is set to read only.

**Is Lintel:** If you check the Auto search lintel beam check box in Function Page, **SADS** checks or un-checks these check boxes for you. Otherwise, you should check or un-check these check boxes manually.

**Lintel Mark:** If the Is Lintel check box is checked, the status of Mark field will be changed to available. You should enter the mark of the lintel beam.

**Line I and Line J:** The line names at both end of bays. These data are retrieved from ETABS files. These fields are read only.

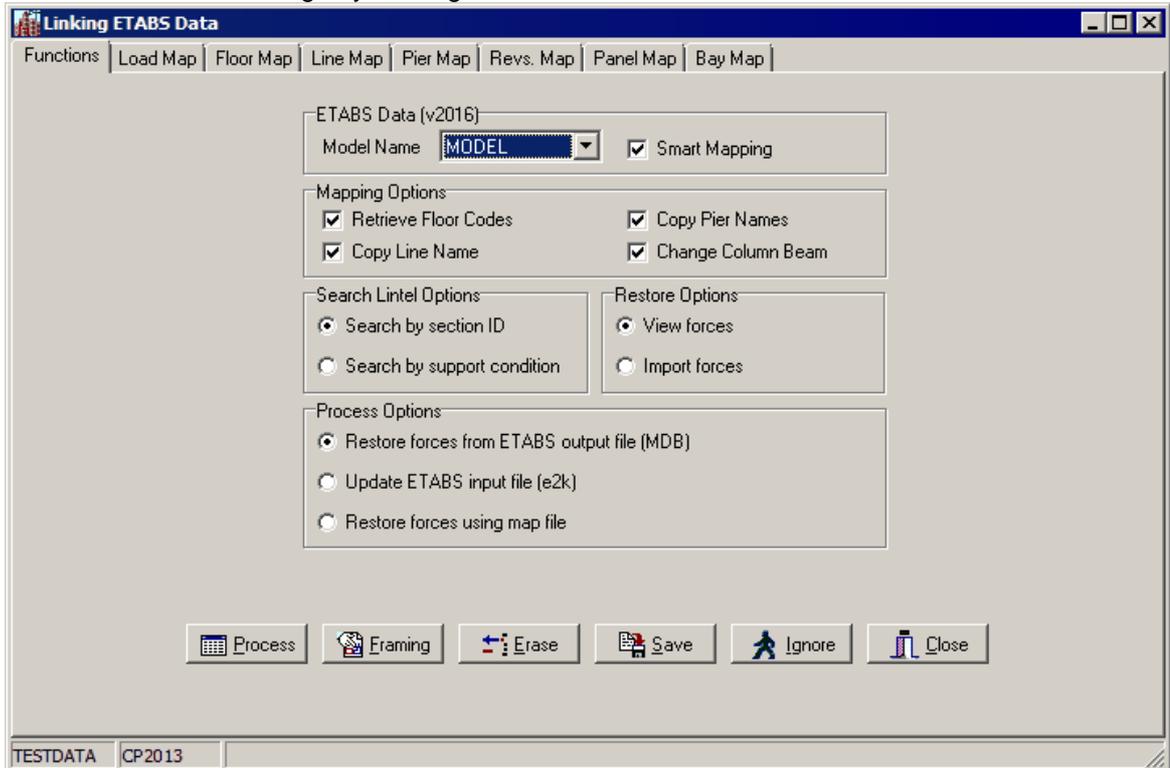
**Revs.:** **SADS** assumes that the end I is located at the left hand side of beam in X-X direction and at lower end of beam in Y-Y direction. If it is not true, **SADS** will set the reverse field to true, i.e. the end condition is reversed. The values of the field are searched by **SADS** and set the field to read only.

For the Insert and Delete button, please refer to [Load Map Page](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing. If you click Save button, **SADS** will display Framing Plan window for editing beam map data. The functions of Framing Plan window will be explain in Display Framing Plan topic.

### 10.4.10 Processing

After you have completed the mapping process and have reviewed the framing plan, you may return to the Function Page by clicking Function Tab.



You may notice that the Process button is enabled. This change indicates the mapping is done and you can start to import ETABS forces and update ETABS input file (e2k file)..

**Restore Options:** This options are available for Restore Forces from ETABS Output File and Restore Forces using Map File options in Processing Options Group Box mentioned below.

**Processing Options Group Box:** There are three functions in the sub-command:

**Restore Forces from ETABS Output File:** You are ready to restore the beam forces, column forces and wall forces from ETABS MDB output file to **SADS** database. When you select this option, the Restore Options will be enabled. You may select the View forces option to view the mapped forces on the windows before you import these forces to **SADS** database.

**Update ETABS Input File.** If there are some modifications of beam sections, column sections, wall section and/or lintel sections after you run pre-design commands of beam, column, wall and lintel in **SADS** according with the requirement of Code of Practice, You may use this function, let **SADS** automatically update the section properties in ETABS input file according to the amended sections in SADS database for further analysis in ETABS.

**Restore Force using Map File:** This option is for back compatibility with linking of ETABS 6 and **SADS 8**. You can prepare the map file according the descriptions of [Map File](#) section. You don't need to perform the mapping process mentioned at following topics. Using the self-prepared map file and MDB output file, you may view mapping forces or import forces in MDB file to SADS database. We don't recommend our users using this option. Using regular mapping is much more stable and safe.

To run these functions, you can click Process button. Or click the Cancel button to close the window.

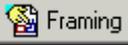
## 10.5 Display Framing Plan

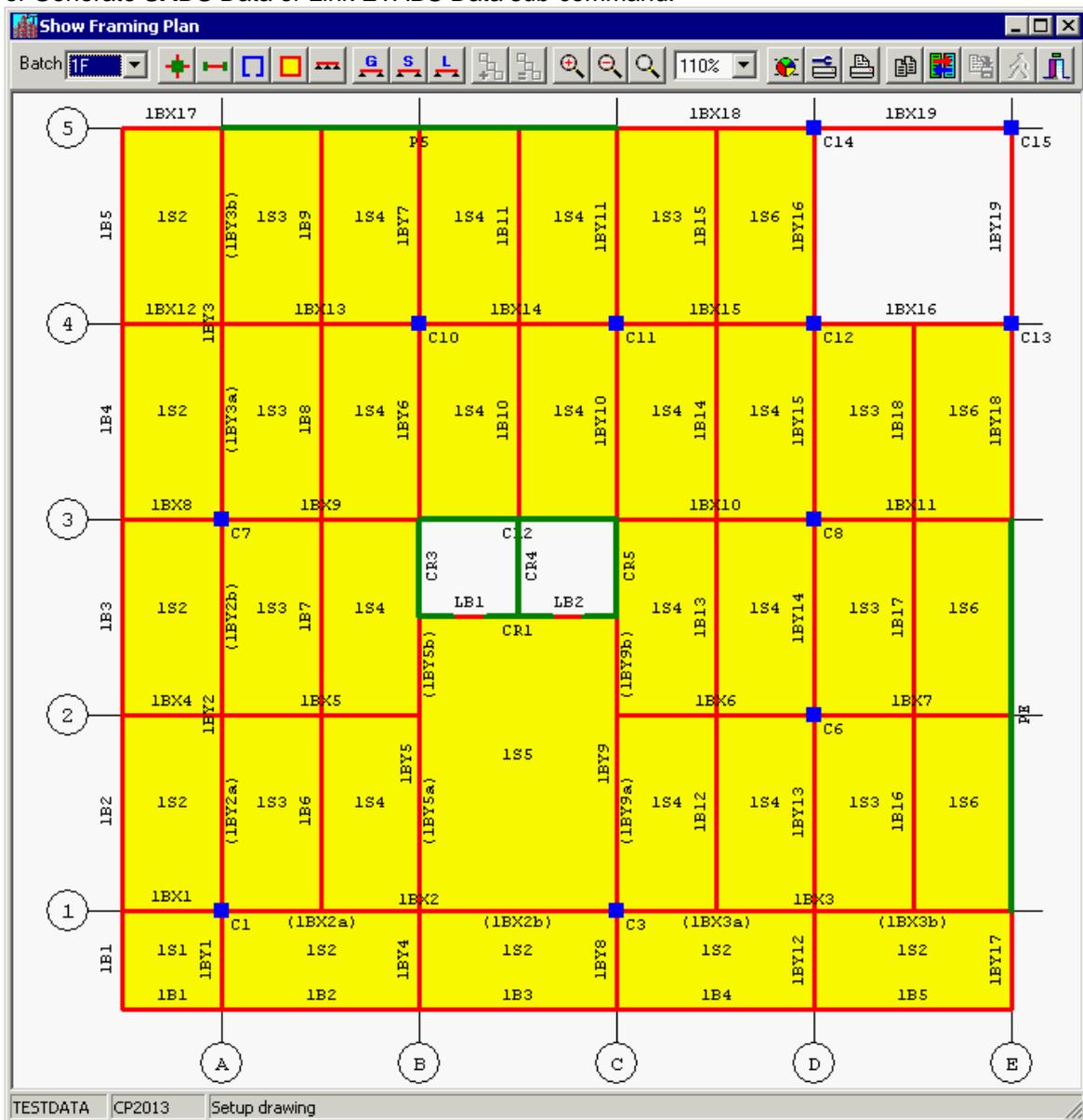
### 10.5.1 Overview

The most powerful part of Link ETABS Data and Generate **SADS** Data sub-commands is the framing plan function. These 2 commands can generate framing plan based on ETABS MDB file.

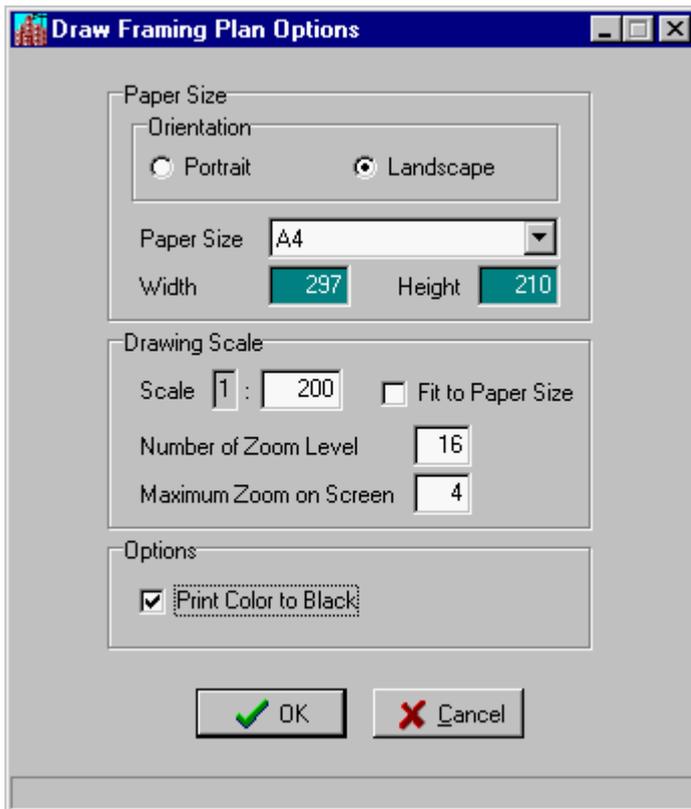
1. You can zoom in and zoom out the framing plan;
2. You can print the framing plan;
3. You can edit the slab marks, beam mark, column marks, wall marks and lintel marks from the framing plan directly.

### 10.5.2 Configuring Framing Plan

The Framing Plan window can be display by clicking the  button on Functions Page of Generate **SADS** Data or Link ETABS Data sub-command.



You may click the Framing Plan Setup button  to display the Draw Framing Plan Options dialog box.



#### Paper Size group box:

**Orientation:** You may select Portrait or Landscape. The default value is landscape.

**Paper Size:** You may set paper size for consistence with the paper of your printer.

**Width & Height:** If you select Custom size, you need to enter the paper size to these edit boxes.

#### Drawing Scale group box:

**Scale:** You may specify the scale of your drawing. The default is 1:200.

**Fit to Paper Size:** If you Scale is not set properly with the paper size, the framing plan may be drawn too large or too small. You may check this check box to ignore the defined scale and fit the framing plan to the specified paper size.

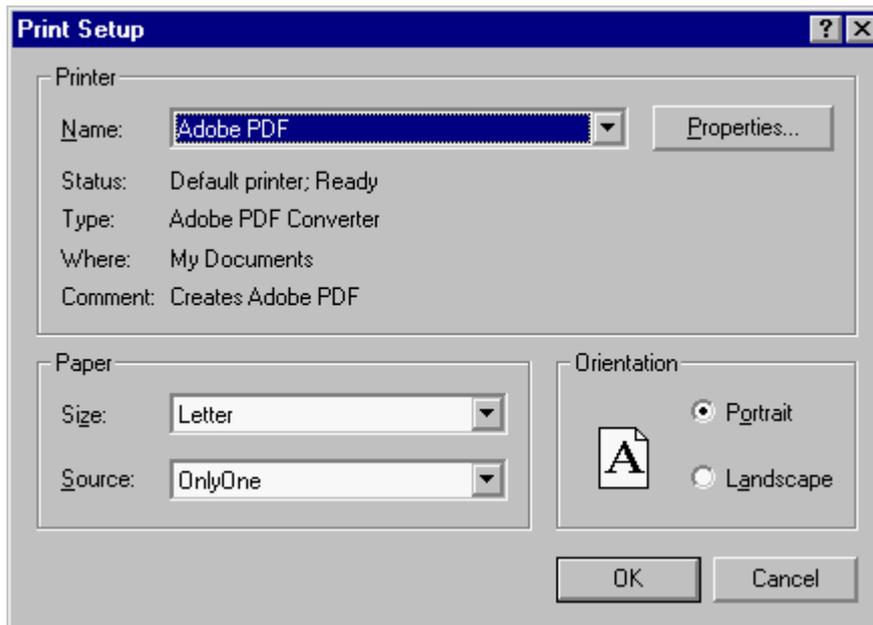
**Maximum Zoom on Screen:** You may specify the maximum zoom ratio. The default value is 4, i.e. the maximum size of on screen drawing is 4 times of original size.

**Number of Zoom Level:** You may define the zoom level number. The default value is 16, i.e. from the original size to the maximum size, you need to click the Zoom In button 16 times.

**Print color to black:** If your printer is not a color printer, you may check the check box to print color framing plan to black.

### 10.5.3 Printing Framing Plan

Before you print your framing plan to printer, you may click the Printer Setup button  to display the Print Setup dialog box to select the printing options. This dialog box may different on your computer according the Windows and printer configuration.



You may select your printer, paper size, orientation, etc to consistent with your [drawing setup](#).

After you select these options, you may click the  button to print your framing plan to your printer.

#### 10.5.4 Selecting Beam and Column

You may use the mouse to select slab, beam, column and wall.

**Column:** Move the cursor to the square symbol of column until the color is changed.

**Beam and lintel:** Move the cursor to the line of beam or lintel until the color is changed.

**Wall:** Move the cursor to the one of the panel of column until the color is changed.

**Slab:** Move the cursor to the center of slab until the color is changed.

**Continuous Beam:** You should click down the Continuous Beam button  first. Then, move the cursor to one of the line of beam until the color is changed.

The changing of color indicates the member is selected for further processing. After the member is selected, you may click the mouse to display edit dialog box to enter the mark and other data for this member.

#### 10.5.5 Handling Framing Plan

By clicking the following buttons, you may zoom in, zoom out and zoom all the framing plan.



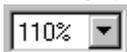
- Click this button to zoom in the framing plan to next level.



- Click this button to zoom out the framing plan back to previous level.



- Click the button to zoom the framing plan to original size.



- Select the desired percentage for zoom in or zoom out the font size.

After you zoom in you framing plan, the framing plan will not be fitted in the window. Some part of framing plan will be invisible. You may push and hold the left button of the mouse, and then drag the mouse. You will find that you can move the framing plan around and you can see any invisible part of framing plan. But, you cannot drag the framing plan when one of the member is [selected](#).

### 10.5.6 Display Options

By clicking the following buttons, you may display additional information to the framing plan.



- Click this button to display line number in ETABS to the line.



- Click this button to display the bay name in ETABS to the bay.



- Click this button to display the panel name in ETABS to the panel.



- Click this button to display the area name in ETABS to the area.



- Click this button to display continuous beam.



- Click this button to display the girder / associate beam with purple color.



- Click this button to display the lintel beam with purple color.



- Click this button to display the secondary beam with purple color.

You may use these display options to understand your framing plan.

### 10.5.7 Colors in Framing Plan

**Slab:** Use yellow color for mapped slab and aqua color for un-mapped slab.

**Beam:** Use red color for mapped beam and maroon (dark red) color for un-mapped beam.

**Column:** Use blue color for mapped column and navy (dark blue) color for un-mapped column.

**Wall:** Use green color for both mapped and un-mapped wall.

**Slab Mark:** Use black color for valid slab mark and red color for slab that does not exist in database.

**Beam Mark:** Use black color for valid beam mark and red color for beam mark that does not exist in database.

**Column Mark:** Use black color for valid column mark and blue color for column mark that does not exist in data base.

**Wall Mark:** Use black color for valid wall mark and green color for wall mark that does not exist in data base.

### 10.5.8 Functional Buttons

By clicking the following buttons, you may perform particular function in the framing plan.



Duplicate button - Duplicate the mapping data of beams and / or slabs from upper floor to lower floor using prefix mapping.



Map button - Map the beam marks using selected options in Function Page.



Save button - After you have entered or edited beam mark and/or column marks, you may click this button to save those data.



Restore button - Before you click the Save button or change to another batch code, you may click this button to restore the previous mapping data.



Close button - You may click this button to close the Framing Plan window. If there are some you have changed, **SADS** will save these data before closing the window.

### 10.5.9 Selecting Framing Plan

The framing plans are generated for each different batch code. The framing plan is displayed for one particular batch code at a time. You can use the [Batch Code combo box](#) to select a framing plan that you want to display.

### 10.5.10 Mapping Beam Marks

After you have finished the mapping of floor, line, pier, bay and area, you can turn to Show Framing Plan window. If you don't map the beam between ETABS and **SADS** before, all beams

have no marks. You can click the Map button  to process the mapping. After you click the Map button, an option dialog box will be displayed.

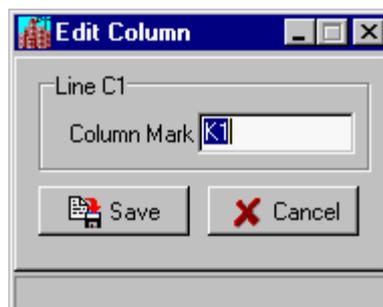
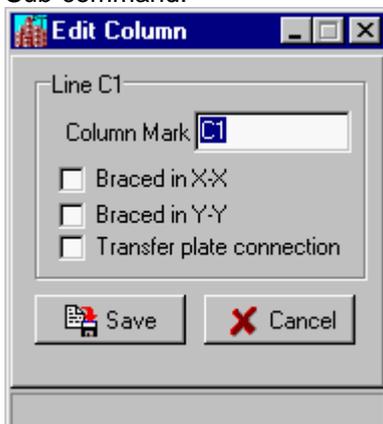


If you select Mapping beams in single batch option, **SADS** will map the beams in current batch only. This option allows you to rollback the mapping to previous status. If you select Mapping beams in all batches option, **SADS** will map all beams in all batches. But, this option can not rollback the mapping to previous status.

After you click the OK button, **SADS** will search the necessary information of beams from **SADS** database in depth. If your database contains correct information, most of bays will be mapped with beam marks automatically. The most important sources are taken from column data. So, the bays that connected to columns are likely mapped to beams in **SADS**. The bays that not connected to column in both ends will lack data to mapped to beams. **SADS** will leaves these beam marks to blank and you should mapped these bays manually in the framing plan.

### 10.5.11 Editing Marks on Framing Plan

**Editing Column:** If you want to add a column mark to a blank line or change the column mark on a line, you may move the mouse cursor toward the line. When the color of the line is changed, you may click the mouse to display the Edit Column dialog box. The left dialog box is displayed by Generate **SADS** Data Sub-command and the right dialog is displayed by Link ETABS Data Sub-command.



You should select and enter the information in the dialog box.

**Column Mark:** Enter the column mark for the line.

**Braced in X-X:** Check the check box if the column is braced column in X-X direction.

**Braced in Y-Y:** Check the check box if the column is braced column in Y-Y direction.

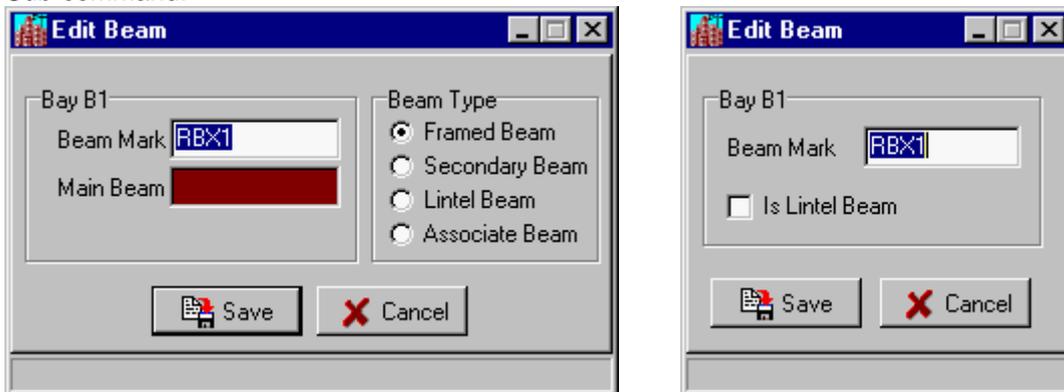
**Transfer plate connection:** If the column is connected to transfer plate at the highest end, check the check box. Otherwise, un-check the check box.

Click Save button to accept these data.

If you want to add or change many column marks that the number is sequentially, e.g. K1, K2, K3,

K4, etc., you don't click the Save button, instead of click down the Repeat Incremental button . When you select the sequential line and click the mouse button, the line is assigned a sequential column mark. After you finish the sequential input, you must click up the Save button in Edit Column dialog box.

**Editing Beam:** If you want to add a beam mark to a blank bay or change the beam mark on a bay, you may move the mouse cursor toward the bay. When the color of the bay is changed, you may click the mouse to display the Edit Beam dialog box. The left dialog box is displayed by Generate **SADS** Data Sub-command and the right dialog box is displayed by Link ETABS Data Sub-command.



You should select and enter the information in the dialog box.

**Beam Type:** Select the type of beam.

**Beam Mark:** Enter the beam mark, lintel mark or associate beam mark according with the type of beam.

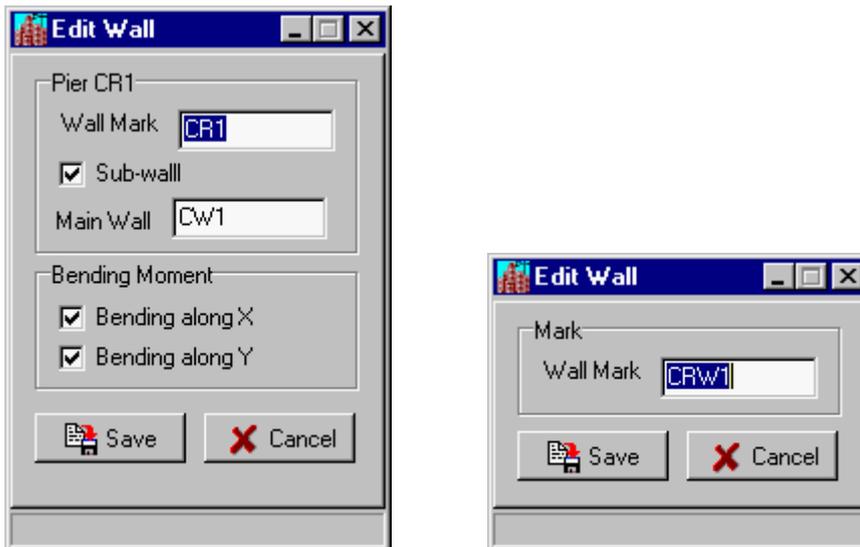
**Main Beam:** Enter the main beam mark if the beam is associate beam.

Click Save button to accept these data.

If you want to add or change many beam marks that the number is sequentially, e.g. RB1, RB2, RB3, RB4, etc., you don't click the Save button, instead of click down the Repeat Incremental

button . When you select the sequential bay and click the mouse button, the bay is assigned a sequential beam mark. After you finish the sequential input, you must click up the Save button in Edit Beam dialog box

**Editing Wall:** If you want to add a wall mark to a blank pier or change the wall mark on a pier, you may move the mouse cursor toward one of the panel of the pier. When the color of the pier is changed, you may click the mouse to display the Edit Wall dialog box. The left dialog box is displayed by Generate **SADS** Data Sub-command and the right dialog box is displayed by Link ETABS Data Sub-command.



You should select and enter the information in the dialog box.

**Wall Mark:** Enter the wall mark for the pier.

**Sub-wall:** Check the check if the wall is sub-wall.

**Main Wall:** If the wall is sub-wall, enter the mark of main wall.

**Bending Along X:** Check the check box if you wish to consider the bending moment of wall in X-X direction.

**Bending Along Y:** Check the check box if you wish to consider the bending moment of wall in Y-Y direction.

Click Save button to accept these data.

You may use the Repeat Incremental button as in Edit Column dialog box.

**Editing Slab:** If you want to add a slab mark to a blank area or change the slab mark on a area, you may move the mouse cursor toward the center of the area. When the color of the area is changed, you may click the mouse to display the Edit Slab dialog box.



You should select and enter the information in the dialog box.

**Slab Mark:** Enter the slab mark for the area.

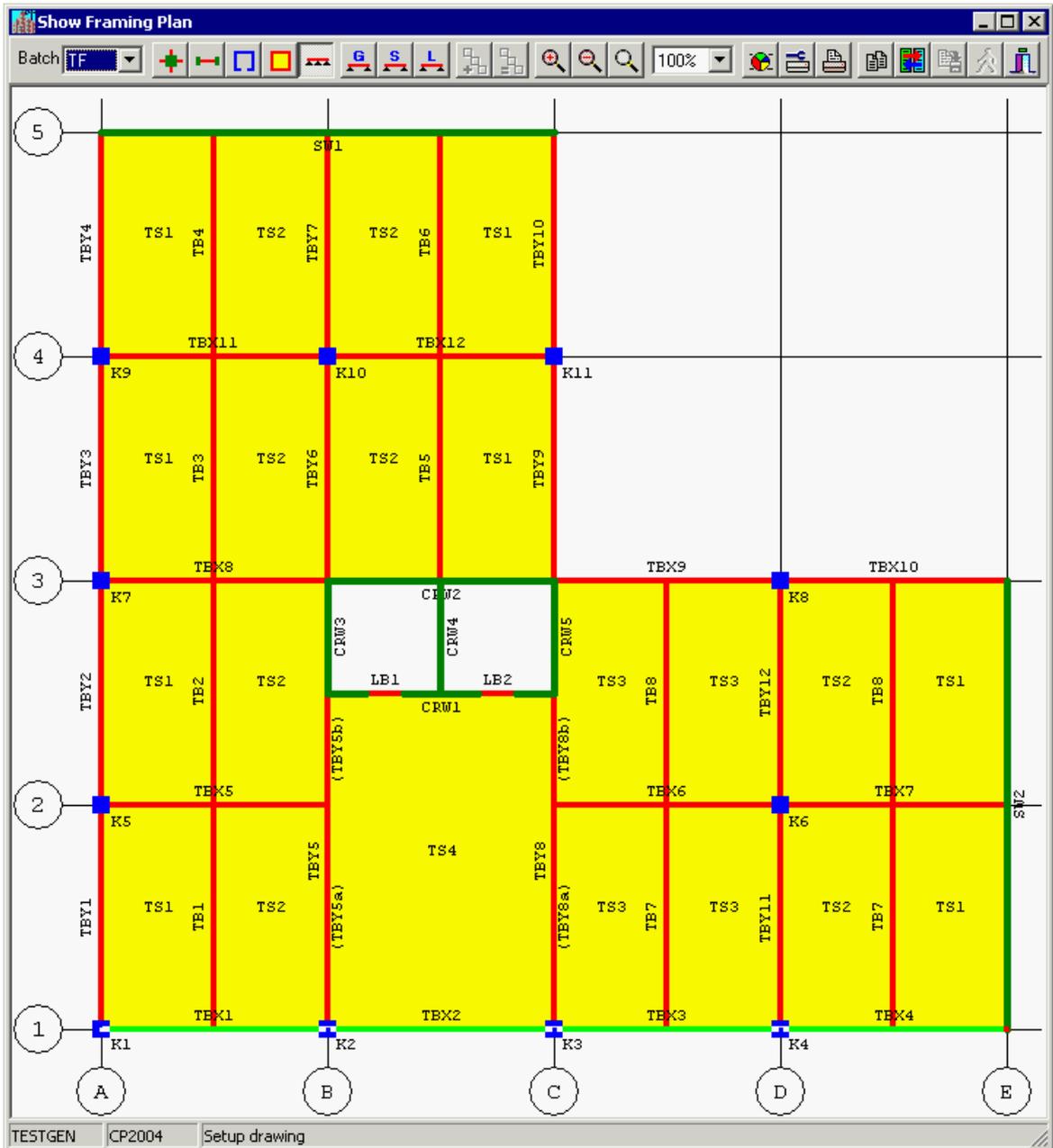
**Slab Type:** Slab type defined in [Maintain Slab Data Sub-command](#).

Click Save button to accept these data.

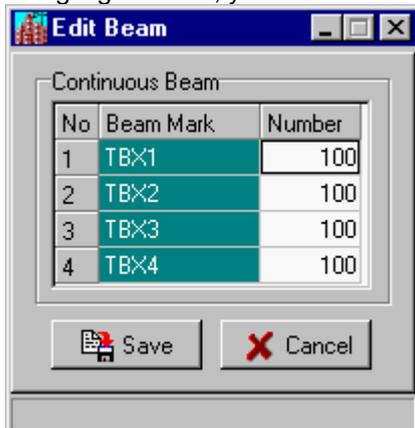
You may use the Repeat Incremental button  and Repeat Equal button  as in Edit Beam dialog box.

**Edit Continuous Beam:** If you want to change the components of continuous beam, you can

click down the Continuous button . When you move the mouse cursor to one of the beam, e.g. TBX2, **SADS** highlights the whole continuous beam TBX1~TBX4.



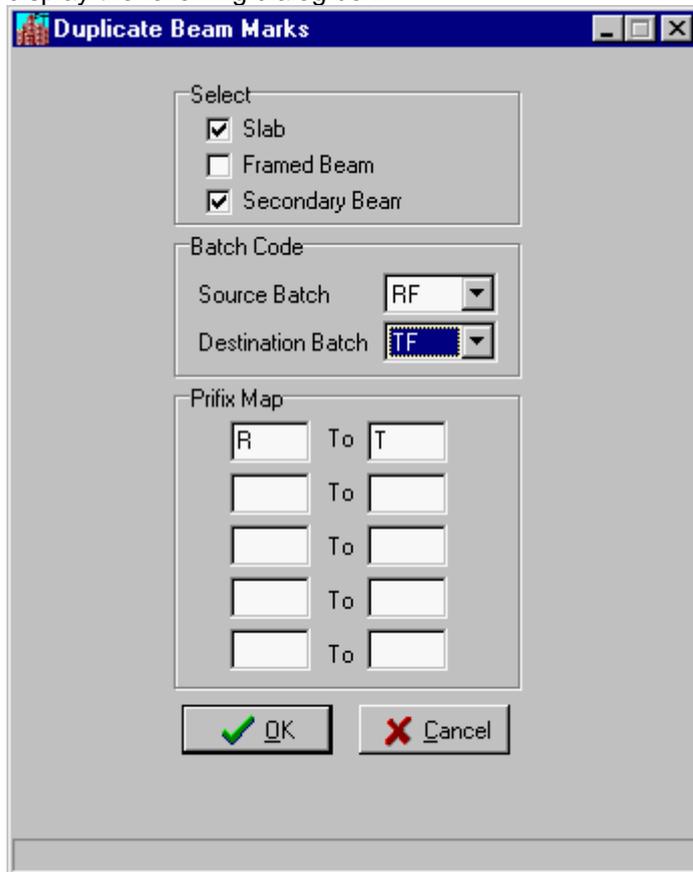
At the highlighted line, you can click the mouse button to display the following dialog box.



**SADS** assigns the same numbers to the component beams in one continuous beam. If you need to split this continuous beam to 2 or more continuous beams for some reasons, you can change the numbers. For example, you need to split this continuous beam to TBX1~TBX2 and

TXB3~TBX4, you may change the numbers of TBX3 and TBX4 to 150.

If you have completed the beam mapping for one floor, e.g. ROOF, and you find the beam mapping of following floor is similar, e.g. typical floor, you may click the Duplicate button  to display the following dialog box.



If both mapping of slab, beam and additional load are similar in source batch and destination batch, you may check both Slab Map, Beam Map and Additional Load check boxes. Otherwise, you should check the desired check box. You may select batch code RF in the Source Batch combo box and select batch code TF in Destination Batch combo box. You should set prefix mapping between these 2 floors and then click the OK button. **SADS** will duplicates the beam marks from roof floor to typical floor using the prefix mapping and display the typical floor framing plan.

## 10.6 Map File

### The Structure and Format of MAP File.

#### 1. Load data:

You must provide one header line named as "\$LOAD", and follows by one data line for each loading case. The data line should be prepared as following format:

Variable	Length	Justify	Entry
ML	10	Right	Load case name.
FILL	2	Left	Filler (2 space characters).
TYPE	3	Left	Type of lateral..
DIRC	3	Left	Direction of lateral load.

#### 2. Floor data:

**If the floor codes for all floors are the same as level names in ETABS file, you may skip this section.**

You must provide one header line named as "\$FLOOR", and follows by one data line for each floor. The data line should be prepared as following format:

Variable	Length	Justify	Entry
LEVEL	10	Right	Level name.
FILL	2	Left	Filler (2 space characters).
CODE	4	Left	Floor code.

**3. Frame data:** There are 5 data sets in frame data.

**3-1. Header data:**

You must provide one header line that includes the header word "\$FRAME:" and the frame mark behind it.

**3-2. Column line data:**

**If no column data will be restored, you may skip this section.**

You may provide one header line named as "\$COLUMN" and follows by one data line for each column line. The data line should be prepared in following format:

Variable	Length	Justify	Entry
ML	10	Left	Line name defined in ETABS.
FILL	2	Left	Filler (2 space characters).
MARK	9	Left	Column mark defined in <b>SADS</b> .

**3-3. Wall data:**

**If no wall data will be restored, you may skip this section.**

You may provide one header line named as "\$WALL" and follows by one data line for each wall. The data line should be prepared in following format. If there is no panel element, skip the section.

Variable	Length	Justify	Entry
MW	10	Left	Pier name defined in ETABS.
FILL	2	Left	Filler (2 space characters).
MARK	9	Left	Wall mark defined in <b>SADS</b> .

**3-4. Wall direction data:**

In ETABS program, the direction of major and minor axis of pier are defined according with the shape of pier. In **SADS**, the major axis of wall is taken along X-X direction and the minor axis of wall is taken along Y-Y direction. If the major axes of all piers are matched with major axes of walls, you can skip the section. Otherwise, you must provide one header line named as "\$REVERSE" and follow by data lines. Each data line contains one pier which the [direction number](#) not equal to 1.

Variable	Length	Justify	Entry
MP	10	Left	Pier name defined in ETABS.
FILL	2	Left	Filler (2 space characters).
DIRC	1	Right	Direction number.
FILL	2	Left	Filler (2 space characters).
FLOOR	40	Left	Set of floor ranges.

If the reverse condition is applied to all floor, the FLOOR is blank. Otherwise, you should provide the set of floor ranges.

**3-5. Bay direction data:**

In ETABS program, the ends of member are marked as End I and End J. In **SADS**, the ends of beam are defined as LHS end and RHS end. If the End I in ETABS is corresponding to LHS end of beam in **SADS** and the End J is corresponding to RHS end of beam, it is normal marking. Otherwise, it is reversed marking. If all bays are using normal end marking, you can skip the section. Otherwise, you must provide one header line named as "\$BAY" and follow by data lines. Each data line contains one bay number which the end marking is reversed.

**3-6. Beam data:**

**If no beam data will be restored, you may skip this section.**

The header line of Beam data include the header name "\$BEAM:" and follows by a set of floor ranges. Each header line follows by data lines that contain the mapping of bay name in ETABS data and beam mark in **SADS**. The beam data that listed under the header line would be restored by **SADS**. The data line should be prepared in following format:

Variable	Length	Justify	Entry
MB	10	Right	Bay name defined in ETABS.
FILL	2	Left	Filler (2 space characters).
MARK	10	Left	Beam mark defined in <b>SADS</b> , if it is lintel beam, enter 2 "^"

characters followed by intel mark.

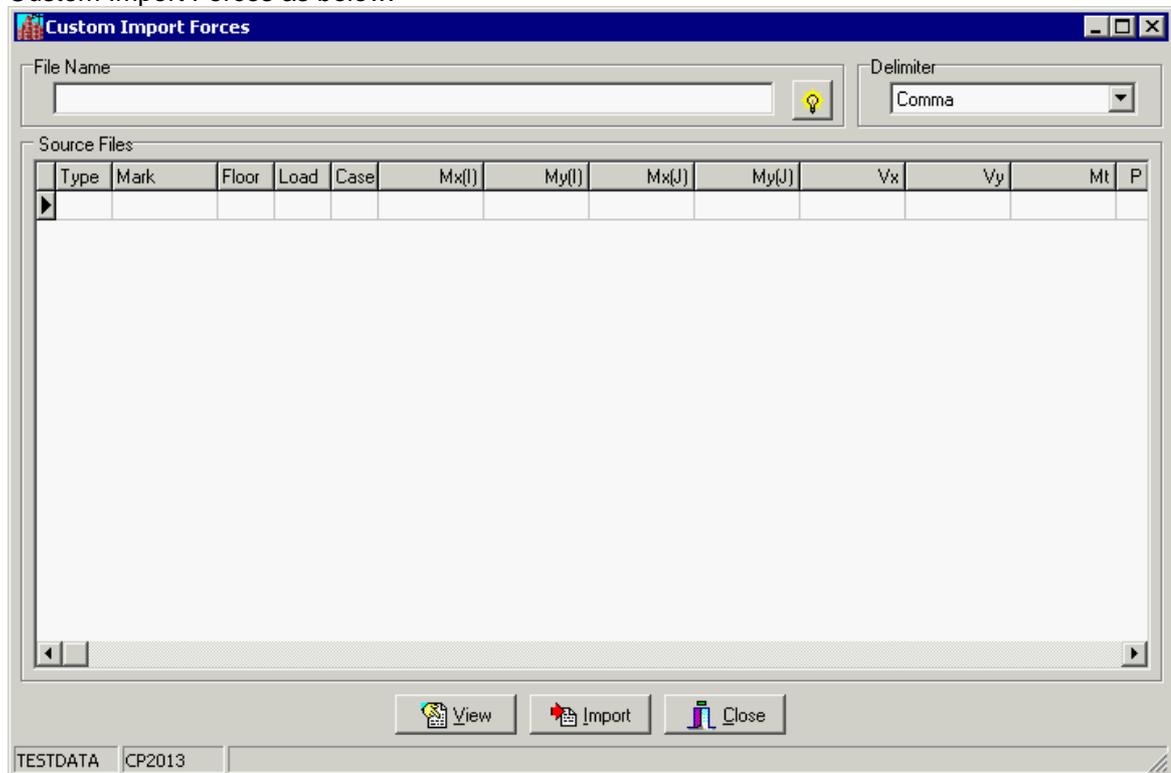
**Note:**

Set of floor range is composed by a list of floor ranges and use "|" as delimiter. If a floor range consists one floor only, the floor range is presented as the floor code of the floor. If the floor range consists more than one continuous floor, the floor range is presented as highest floor code and lowest floor code with "-" delimiter. For example, the set of floor ranges 13FL-9/FL.|5/FL.|3/FL consists 13FL, 12FL, 11FL, 10FL, 9/FL, 5/FL and 3/FL.

## 10.7 Custom Import Forces Sub-command

The Custom Import Forces sub-command is use to convert the ASCII file that contain the result of other analysis method's you did import to **SADS** data base.

When you choose Custom Import Forces from Analysis Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Custom Import Forces as below.



**File Name Group Box** : Enter the folder and ASCII file name or use  button to select the folder and ASCII file name.

**Delimiter Group Box** : Click the combo box to select the delimiter you used for generate ASCII file. The options here are : "Comma", "TAB" and "Space".

After finished to supply the above information, click "View" button, **SADS** will then display the result in the **Source Files Group Box**. You may verify those value are correct or not. If you want to import to the **SADS** data base, click "Import" button. Otherwise, click the "Cancel" button.

## 10.8 ASCII File for Custom Import

### The structure and format of ASCII file for custom import.

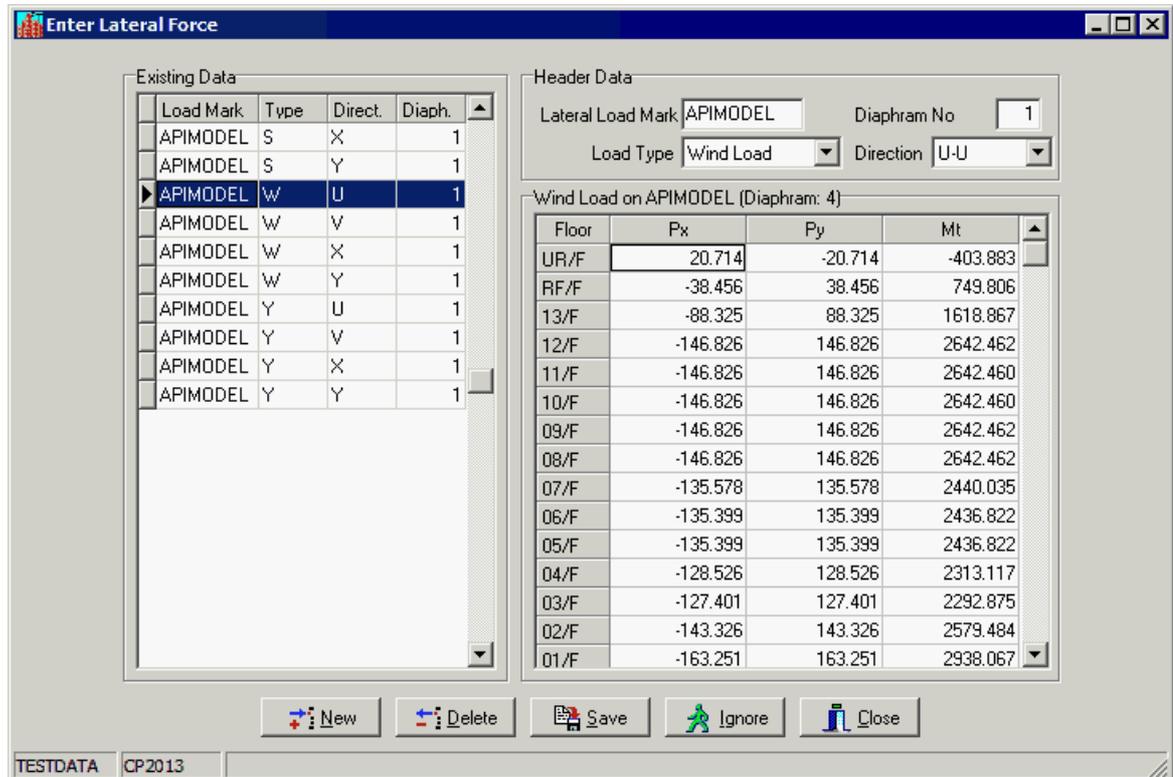
You must provide one line for each load. The line should be prepared as following format:

Variable	Type	Entry
TYPE	Char	Type of member: B - beam; C - column; W - wall.
MARK	String	Mark of beam, column or wall.
FLOOR	String	Floor code.
LOAD	Char	Type of load: W - wind load; S - soil load; Y - dynamic load.
CASE	Char	Loading cases: X - load along X-X; Y - load along Y-Y.
MX(I)	Float	Moment along X-X at I end, unit: kN-M.
MY(I)	Float	Moment along Y-Y at I end, unit: kN-M.
MX(J)	Float	Moment along X-X at J end, unit: kN-M.
MY(J)	Float	Moment along Y-Y at J end, unit: kN-M.
VX	Float	Shear along X-X, unit: kN.
VY	Float	Shear along Y-Y, unit: kN.
MT	Float	Torsion, unit: kN-M.
P	Float	Axial load, unit: kN.

## 10.9 Lateral Load Sub-command

The Lateral Load sub-command is use to input and edit the the lateral loads.

When you choose Lateral Load from Analysis Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Lateral Load Data as below.



The screenshot shows the 'Enter Lateral Force' dialog box. It contains two main sections: 'Existing Data' and 'Header Data'.

**Existing Data:** A table listing existing lateral loads.

Load Mark	Type	Direct.	Diaph.
APIMODEL	S	X	1
APIMODEL	S	Y	1
APIMODEL	W	U	1
APIMODEL	W	V	1
APIMODEL	W	X	1
APIMODEL	W	Y	1
APIMODEL	Y	U	1
APIMODEL	Y	V	1
APIMODEL	Y	X	1
APIMODEL	Y	Y	1

**Header Data:** Fields for Lateral Load Mark (APIMODEL), Diaphragm No (1), Load Type (Wind Load), and Direction (U-U).

**Wind Load on APIMODEL (Diaphragm: 4):** A table showing wind load data for various floors.

Floor	Px	Py	Mt
UR/F	20.714	-20.714	-403.883
RF/F	-38.456	38.456	749.806
13/F	-88.325	88.325	1618.867
12/F	-146.826	146.826	2642.462
11/F	-146.826	146.826	2642.460
10/F	-146.826	146.826	2642.460
09/F	-146.826	146.826	2642.462
08/F	-146.826	146.826	2642.462
07/F	-135.578	135.578	2440.035
06/F	-135.399	135.399	2436.822
05/F	-135.399	135.399	2436.822
04/F	-128.526	128.526	2313.117
03/F	-127.401	127.401	2292.875
02/F	-143.326	143.326	2579.484
01/F	-163.251	163.251	2938.067

At the bottom of the dialog, there are buttons for 'New', 'Delete', 'Save', 'Ignore', and 'Close'. The status bar at the bottom shows 'TESTDATA CP2013'.

**Existing Data Group Box :** The list box is the listing of the existing lateral load that you created previously in this program or provided from the [Wind load sub-command](#). You may search the desired load code followed the steps of [Incremental Search](#) at "Window component" topic in "How to use **SADS**" chapter.

**Header Data Group Box :**

**Load Code Mark** - Enter up to 10 alphanumeric characters long for the mark, this mark must be same as model name of Online Linking data which are going to be calculate the lateral loads.

**Diaphragm no.** - Enter "1" if you use the built in three dimension analysis. If you use ETABS, enter the diaphragm number of ETABS.

**Load Type** - Click the combo box and select the load type is wind load,soil load or dynamic load.

**Direction** - Click the combo box and select the direction of selected lateral load.

**Loads of the Selected Lateral Load Group Box :** The nomination of this group box is according to the load type and diaphragm of the selected load mark. The information are divided into two parts, the first three indicates the loads at X-X direction of global coordinates and the other is the loads at Y-Y direction of global coordinates.

**Px** - Indicates the lateral point loads due to wind loads, soil loads or dynamic loads in selected direction. Enter the value on it.

**Py** - Indicates the lateral point loads due to wind loads, soil loads or dynamic loads in selected direction. Enter the value on it.

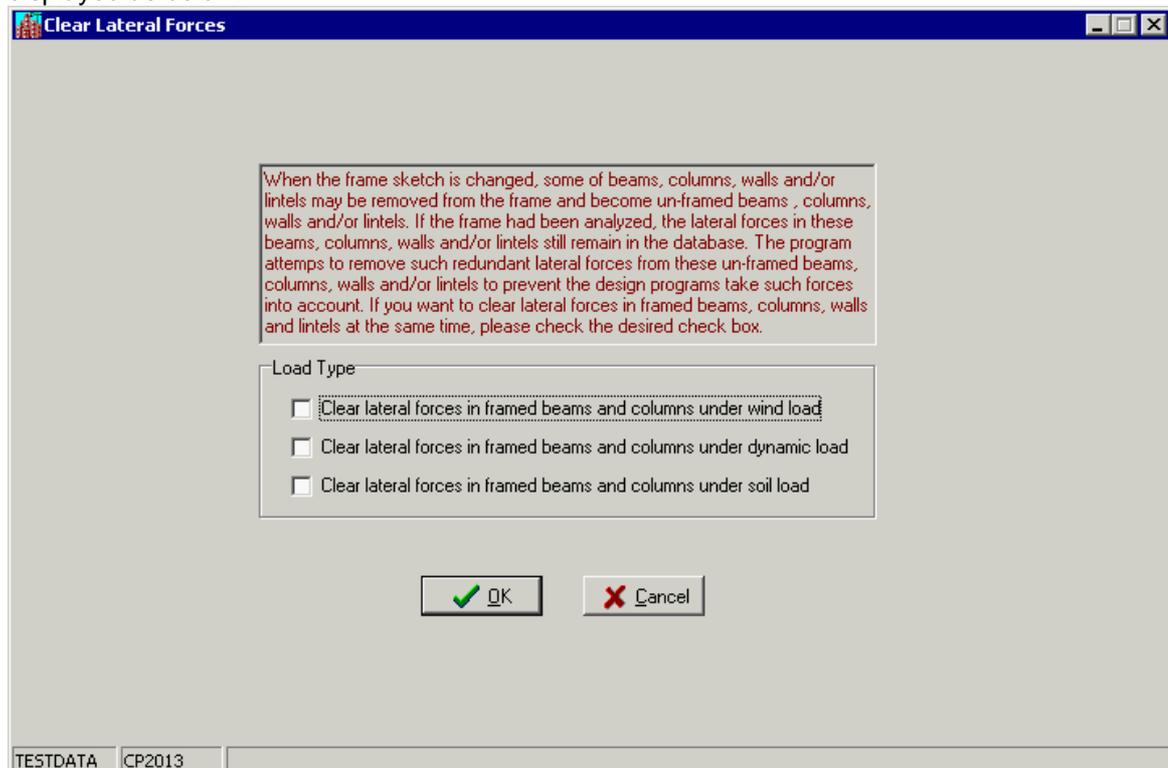
**Mt** - Indicates the torsional moment which applied to each floor of substructure. Enter the value of Mt (in kN-M).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 10.10 Clear Lateral Load Sub-command

The Clear Lateral Load sub-command is use to clear the lateral loads of the un-frame beams or the specific loads of frame beams.

When you choose Clear Lateral Load from Analysis Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), the Clear Lateral Load will be displayed as below.



The detail of this sub-command tell you how to clear the lateral forces of un-frame beams and

frame beams. First is about the un-frame beams, if you have amend the frame sketch and take out some beams from that frame sketch, the lateral forces of those un-frame beams should be clear with this sub-command, click the "OK" button, **SADS** will clear the lateral loads of all un-frame beams.

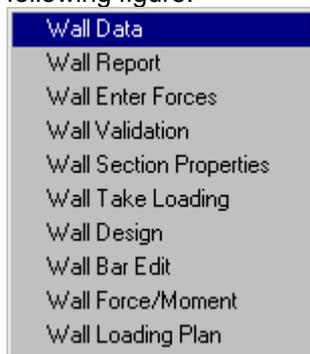
At the same time, if you want to clear some lateral loads (e.g. wind load, soil load and dynamic load) of the frame beams, click the appropriate check box, **SADS** will then clear the relevant loads of the frame beams at the same time.

## 11 Wall Command

### 11.1 About Wall Command

In the Wall Command, you can supply the data, forces and torsional inertia of wall, to amend the existing wall data, validate the data you supplied, take wall loading, pre-design, adjust reinforcement bar, design the calculation of wall and plot the loading plane.

When you choose Wall command from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the wall sub-command buttons are display as below.



The Sub-commands are:

1. Maintain Wall Data Sub-command.
2. Print Wall Report Sub-command.
3. Enter Wall Forces Sub-command.
4. Validate Wall Data Sub-command.
5. Wall Section Properties Sub-command.
6. Take Wall Loading Sub-command.
7. Design of Wall Sub-command.
8. Edit Wall Bar Sub-command.
9. Wall Force and Moment Sub-command.
10. Wall Loading Plan Sub-command.

### 11.2 Maintain Wall Data Sub-command

#### 11.2.1 Maintain Wall Data

The Maintain Wall Data sub-command is use to create a new wall data, wall loads and wall sections, or to amend an existing wall data, wall loads and wall sections.

When you choose Wall Data from Wall Command or click  button on [Command Button Bar](#)

then click  button on [Sub-command Button Bar](#), **SADS** will display the Maintain Wall Data as

below.

The Maintain Wall Data sub-command have three pages.

1. Update Wall Data Page.
2. Update Wall Section Page.
3. Update Wall load Page.

Click the Update Wall Data Page, **SADS** will display the Update Wall Data Page as below.

The screenshot shows the 'Maintain Wall Data' dialog box. The 'Existing Walls' list on the left includes CR1, CR2, CR3, CR4, CR5, CW1 (selected), P5, and PE. The 'Header Data' section for CW1 shows: Wall Mark: CW1, Sub-wall: unchecked, Auto Generate: checked, Local X: 6.000, Local Y: 9.000, Angle: 0.000. The 'Wall Data' table is as follows:

Floor	Check	Height	Lex	Ley	Sect.Code	Load Code	R.F.	Fix
06/F	N	3.200			CW1S03	CW1L04	40	<input type="checkbox"/>
05/F	N	3.200			CW1S04	CW1L04	40	<input type="checkbox"/>
04/F	Y	3.200			CW1S04	CW1L04	40	<input type="checkbox"/>
03/F	N	3.200			CW1S04	CW1L04	40	<input type="checkbox"/>
02/F	Y	4.000			CW1S04	CW1L05	40	<input type="checkbox"/>
01/F	Y	5.000			CW1S04	CW1L06	40	<input type="checkbox"/>
GR/F	Y	3.500			CW1S04	CW1L08	40	<input type="checkbox"/>
BS/F	Y	1.800			CW1S04	CW1L09	40	<input type="checkbox"/>

The 'Vehicular Load Info on GR/F' section shows: Load Class: 6B, Loaded Length: 6.000, Distributed qk: 11.381. The bottom of the dialog has buttons for Add, Insert, Delete, Copy, Save, Ignore, and Close.

**Existing Wall Mark Group Box :** The list box is the listing of the existing Wall marks which have previously created. You may search the desired wall mark using [incremental search](#)

described in How to use **SADS** topic. There is a  button under the box, so you can rearrange the order of the existing wall marks, followed the steps of [re-arrange marks](#) in How to use **SADS** topic.

#### Header Data Group Box :

**Wall Mark** - Enter the alpha numerical up to 8 characters long for the wall mark.

**Sub-wall** - Check the check box if the wall to be considered as a sub-wall.

**Auto Generate** - If the wall data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input wall data manually, you don't check this check box.

**Main Wall Mark** - If this wall is a sub-wall, enter the mark of the main wall.

**Bending Along X** - Check the check box if you wish to consider the bending moment of wall in X-X direction.

**Bending Along Y** - Check the check box if you wish to consider the bending moment of wall in Y-Y direction.

**Accumulate in X-X** - Check the check box if you want to accumulate bending moment of wall in X-X direction.

**Accumulate in Y-Y** - Check the check box if you want to accumulate bending moment of wall in Y-Y direction.

**Check in X-X** - Check the check box if you wish to the slenderness of wall in X-X direction.

**Check in Y-Y** - Check the check box if you wish to the slenderness of wall in Y-Y direction.

**Braced in X-X** - Check the Check in X-X check box, you need to check or un-check this check box.

**Braced in Y-Y** - Check the Check in Y-Y check box, you need to check or un-check this

check box.

**Local X** - Enter the coordinate X of origin of local axis of the wall refer to global axis.

**Local Y** - Enter the coordinate Y of origin of local axis of the wall refer to global axis.

**Angle** - Enter the angle of local x axis refer to global axis.

Notes: The last 3 data are required when you attempt to link **SADS** with ETABS. The global axis must be the same for both **SADS** and ETABS.

#### Wall Data Group Box :

**Floor** - The listing of the [floor code](#) that you previously defined in Floor Data Sub-command.

**Check** - Click the combo box and select the following options.

"Y" -- Indicates the section of wall will be checked in this floor.

"N" -- Indicates the section of wall will not be checked in this floor.

" " -- If the wall does not exist at this floor, just skip it.

**Height** - The height of wall (in M). **SADS** automatically calculate the value from [floor data sub-command](#). If you want to change it, enter the value.

**Lex** -- If Check X-X check box in Slenderness group box is checked, the effective height in X-X direction of wall should be entered to the field, unit: M.

**Ley** -- If Check Y-Y check box in Slenderness group box is checked, the effective height in Y-Y direction of wall should be entered to the field, unit: M.

**Sect. Code** - Indicates the group of same dimension of the wall in the existing floor, every different wall dimension of the building should have a section code. Enter up to 8 alphanumeric characters long for the name of Section Code.

**Load Code** - Indicates the group of wall loads in the existing floor of the building, same as Section Code, every different load in the existing building floor should have a Load Code. Enter up to 8 alphanumeric characters long for the name of Load Code.

**Reduct** - Enter the percentage (%) of the reduction of live load.

**Fix Ded** - If the check box is checked, the live load reduction percentage of this floor is fixed. When accumulating this live load to other lower floors, the reduction percentage should not be altered with the reduction percentage of the relevant floor. Otherwise, when accumulate the live load of this floor to other lower floors, the reduction percentage of the lower floors will be used.

#### Vehicular Load Info on XXXX Group Box:

**Load Class** - There are 5 options you can select.

- N/A
- 6B
- 6D
- 6C
- 6E

If you select the N/A option, the loaded length and distributed qk data are not necessary.

These 2 edit boxes are disabled. Otherwise, you need to provide the following data.

**Loaded Length** - Enter the data according the appendix B item #9 of CoP 2011.

**Distributed qk** - For Class 6B to 6D, the data is calculated according with formulas in Appendix C of taken from Table 3.6 of CoP 2011. For Class 6E, this data is calculated using formulas in Clause 2.10.1 of SDM.

If you want to copy the wall data from upper floor to the lower floor, highlight any field of the

desired floor then click  button, **SADS** will copy all information except the height of wall from upper floor to this floor.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing or click the Update Wall Load Page to display the Update Wall Load Page.

## 11.2.2 Maintain Wall Section

Click the Update Wall Section Page, **SADS** will display the Update Wall Section Page as below.

No.	B(M)	D(M)	X(M)	Y(M)	Angle	r(%)	S.Lag	Panel	Sub-wall
1	1.000	0.200	1.000	-0.100	0.00	0.000	N	W14	CR1
2	1.000	0.200	4.000	-0.100	0.00	0.000	N	W15	CR1
3	1.000	0.200	0.000	-0.100	0.00	0.000	N	W2	CR1
4	1.000	0.200	2.000	-0.100	0.00	0.000	N	W3	CR1
5	1.000	0.200	3.000	-0.100	0.00	0.000	N	W4	CR1
6	1.000	0.200	5.000	-0.100	0.00	0.000	N	W5	CR1
7	3.000	0.200	0.000	2.900	0.00	0.000	N	W10	CR2
8	3.000	0.200	3.000	2.900	0.00	0.000	N	W11	CR2
9	0.200	3.000	-0.100	0.000	0.00	0.000	N	W7	CR3
10	0.200	3.000	5.900	0.000	0.00	0.000	N	W9	CR5
11									
12									
13									
14									

**Existing Section Code Group Box :** The list box is the listing of the existing section code you created in Update Wall Data Page. You may search the desired section code using [incremental search](#) described in How to use **SADS** topic.

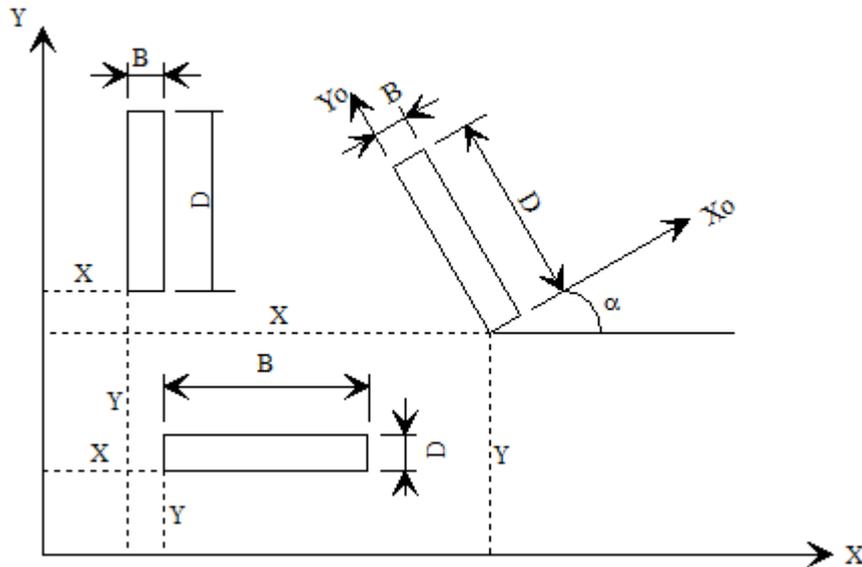
### Header Data Group Box :

**Section Code** - Enter the section code which you have named in the Update Wall Data Page.

**Effective of Shear Lag** - **SADS** provided the effective range 0.0 to 1.0 for the effect of shear lag, 0.0 is the minimum effect of shear lag, 1.0 is the maximum effect of shear lag. Enter a number between 0.0 and 1.0 for partial considering the effect of shear lag as you wish.

**Torsional Inertia** - Enter the value of torsional inertia (in  $M^4$ ).

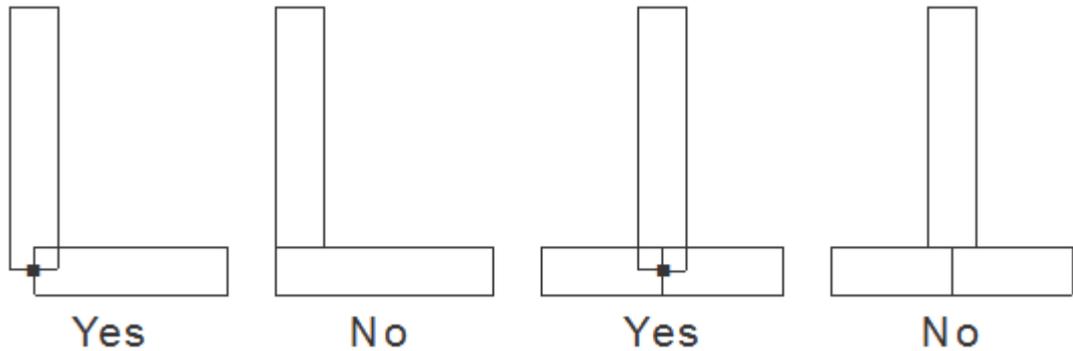
**Wall Section Group Box :** The information of this page are variant dimension about the section elements of wall, the followed figure shows you graphically about the dimension.



- B** - Enter the value of the horizontal dimension (in M) of the section element if the edges of section element are parallel to coordinate axis of wall section. If not parallel, enter the dimension of the smaller edge of the section element.
- D** - Enter the value of the vertical dimension (in M) of the section element if the edges of section element are parallel to coordinate axis of wall section. If not parallel, enter the dimension of the larger edge of section element.
- X, Y** - Enter the coordinates (in M) of the lower left corner point of section element if the edges of section element are parallel to coordinate axis of wall section. If not parallel, enter the origin coordinates of section element.
- Angle** - Enter the inclined angle between the long edge of section element and X - axis of wall section if the edges of section element are not parallel to coordinate axis of wall section. Otherwise enter zero.
- r%** - Enter a percentage of reinforcement (should be > 0.0%) if you want to specify the reinforcement of the section element. Otherwise the reinforcement of the section element should be determined by **SADS**.
- S. Lag** - Indicate the flag of shear lag. Click the combo box and select the following options.  
**"X"** -- If the section element is a shear lag at the moment of X-X direction.  
**"Y"** --If the section element is a shear lag at the moment of Y-Y direction.  
**"N"** --If the section element is not a shear lag.
- Panel** - The corresponding panel name in ETABS data. If the data is assigned correctly, the thickness of panel in [map data](#) is synchronized with wall section element in SADS data base.
- Sub-wall** - If the element is belong to a sub-wall, enter the mark of sub-wall.

If you want to view graphically about the existing wall section, click  key, **SADS** will then graphically display the loading on the dialog box.

**Recommendation:** When 2 or more section elements intersect at a point, we recommend using the following styles.

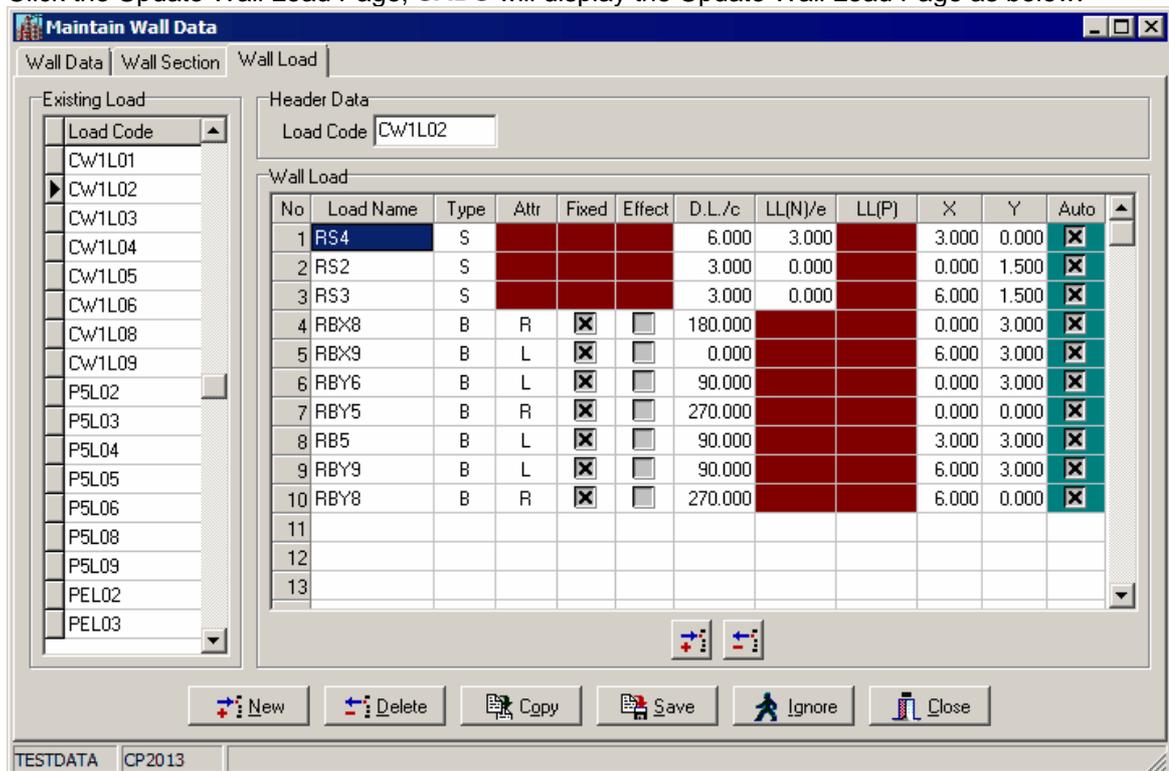


This connection style is good for online linking and ETABS modeling. If you want to insert a wall section in front of the existing wall section, you may highlight the existing one and click  key, **SADS** will provide a row enable you to insert a new wall section. If you want to delete an existing wall section, highlight the wall section and click  key, **SADS** will then delete the highlighted wall section.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 11.2.3 Maintain Wall Load

Click the Update Wall Load Page, **SADS** will display the Update Wall Load Page as below.



**Existing Load Code Group Box :** The list box is the listing of the existing load code you created in Update Wall Data Page. You may search the desired load code using [incremental search](#) described in How to use **SADS** topic.

**Header Data Group Box :**  
**Load Code** - Enter the load code which you have named in the Update Wall Data Page.

**Wall Load Group Box :**

**Load Name** - Enter up to 12 alphanumeric characters long for the name of the loading which applied to the specific wall section. If the loading is a slab or beam, you should enter the exact slab mark or beam mark. If the loading is a column, you should enter the column mark and floor code (i.e. K1ROOF, K36TH.).

**Type** - The type of load. Click the combo box and select the following options.

"B" -- the load will be extracted by **SADS** from the reaction of corresponding beam mark.

"L" -- the load will be extracted by **SADS** from the reaction of corresponding lintel beam mark.

"S" -- the load will be extracted by **SADS** from the reaction of corresponding slab mark.

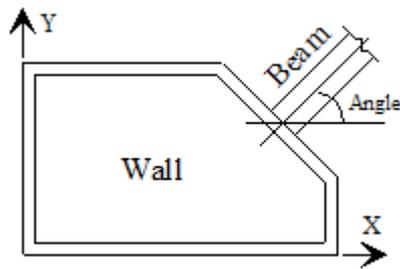
"C" -- the axial loads will be extracted by **SADS** from the column at the corresponding floor.

"E" -- the dead load and live load must be input by the user.

"M" -- the load is concentrated moment.

**Attr** - If the Type is "B" or "L", you should select "L" for load at left hand side or "R" for load at right hand side.

**Fixed** -- Check the check box if you want to consider the fixed end moment of the beam when the above "Type" is "L" or "R". Then you may enter the angle between the corresponding beam and the X-axis of the wall in the D.L. field. The followed diagram shows the angle. Also, you should check this check box if the Type is "M".

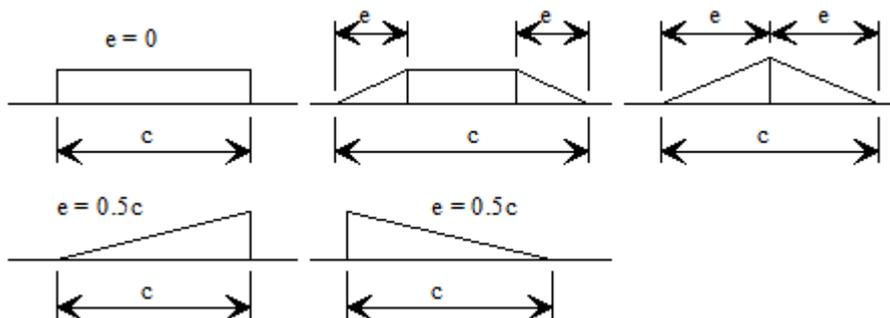


**Effect** -- This data is equivalent with **Take Lateral Loads Effect** in page 161 of **SADS 12** user's manual. If you are using ETABS for analyzing your building and your model has one frame only, you can uncheck these check boxes. If the loading is a beam and bearing wall is not belong in same frame that beam located, you should check the check box. **SADS** will consider the lateral load effect from beam load to wall.

**D.L./c** - If the "Type" is "E", enter the dead load (in kN). If the "Type" is "M", enter the dead load moment (in kN-M). If the "Type" is "S", click the edit box and enter the length (in M) of distributed load. In below diagram, symbol "c" indicates the length of distributed loads. If the "Fixed" check box is checked, enter the angle, refer to above section.

**LL(N)/e** - If the "Type" is "E", enter the non-permanent live load (in kN). If the "Type" is "M", enter the non-permanent live load moment (in kN-M). If the "Type" is "S", click the edit box and enter the value of 1/2 load length in triangularly distributed or the length of the triangular part in trapezoidal distributed. Refer to below diagram, symbol "e" is about the length of loads.

**LL(P)** - If the "Type" is "E", enter the permanent live load (in kN). If the "Type" is "M", enter the permanent live load moment (in kN-M).



**X, Y** - If the "Type" is "M", enter the angle of moment in along direction (in degree) to the X. Otherwise, enter the coordinates of load center to the origin of section coordinates (in M).

**Auto** - If the wall load is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input wall load manually, you don't check this check box.

If you want to insert a loading in front of the existing load, you may highlight the existing one and click  key, **SADS** will provide a row enable you to insert a new loading.

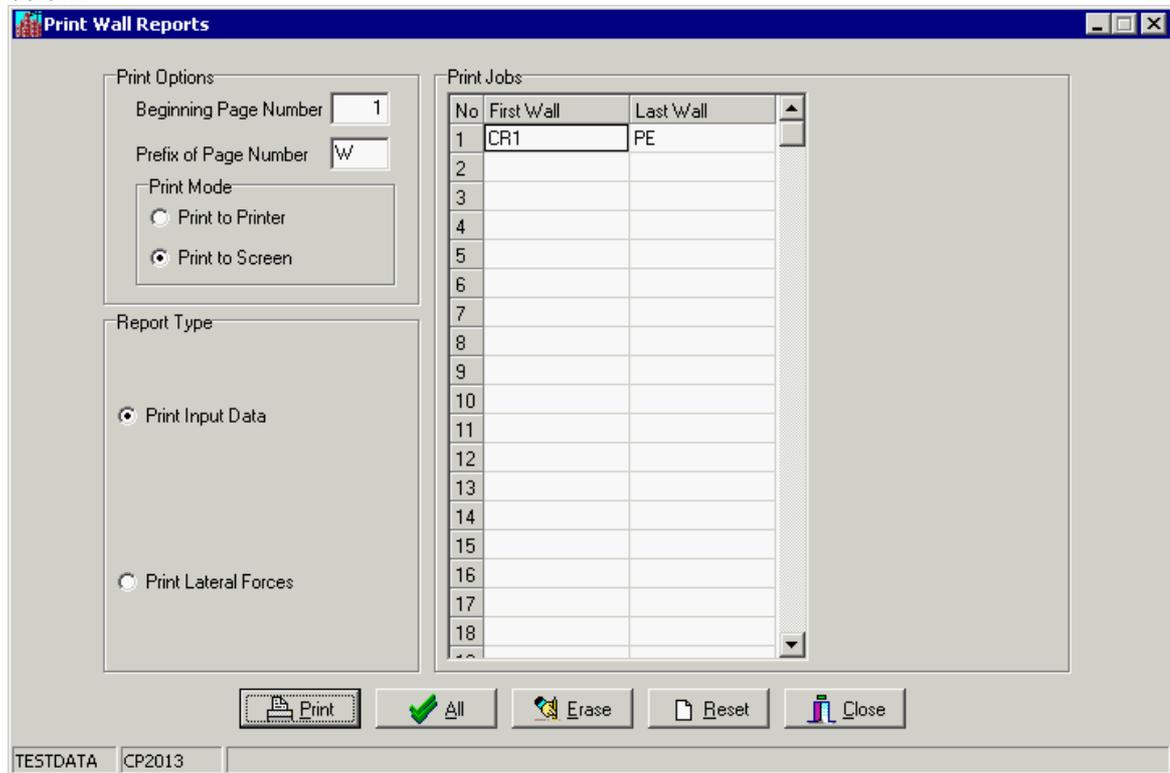
If you want to delete an existing loading, highlight the loading and click  key, **SADS** will then delete the highlighted load.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 11.3 Print Wall Report Sub-command

The Print Wall Reports Sub-command allows you to print out or display the wall data, wall load, wall section, the shears, bending moments and axial forces of walls that produce from lateral load for checking or other purposes.

When you choose Wall Reports from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Wall Reports as below.



No	First Wall	Last Wall
1	CR1	PE
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "W".

#### Print Jobs Group Box:

**First Wall** - Click the combo box to select the beginning wall mark which is going to be reported.

**Last Wall** - Click the combo box to select the last wall mark which is going to be reported. You may use [incremental search](#) to select the desired wall marks.

If the report type is Print Lateral Forces, you need to supply the third and fourth fields:

**Load Type** - Click the combo box to select wind load, soil load or dynamic load you want to print.

**Direction** - Click the combo box to select the direction of lateral load: X-X or Y-Y.

**Report Type Group Box:** Click the radio button and select the subject you want. There are 2 subjects:

**Print Input Data** - print or display the wall data for your checking.

**Print Lateral Load** - print or display the moment and shear produced by lateral load for your checking.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

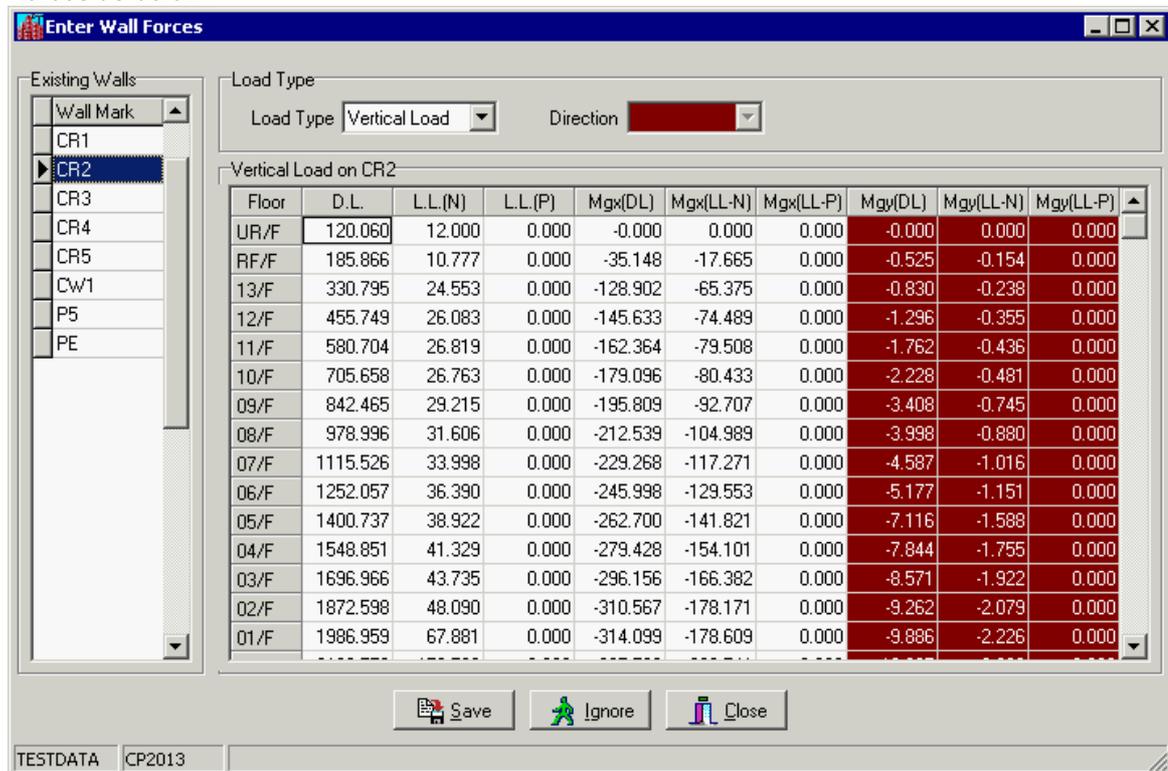
## 11.4 Enter Wall Forces Sub-command

### 11.4.1 Enter Wall Vertical Load

The Enter Wall Force Sub-command enables you to enter the vertical loads, wind loads, soil loads or dynamic loads of the selected wall manually. If you do not want to use the result calculated by **SADS** for any reason, **SADS** provides this Sub-command for your convenience.

When you choose Wall Enter Forces from Wall Command or click  button on [Command](#)

[Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Enter Wall Forces as below.



Floor	D.L.	L.L.(N)	L.L.(P)	Mgx(DL)	Mgx(LL-N)	Mgx(LL-P)	Mgy(DL)	Mgy(LL-N)	Mgy(LL-P)
UR/F	120.060	12.000	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
RF/F	185.866	10.777	0.000	-35.148	-17.665	0.000	-0.525	-0.154	0.000
13/F	330.795	24.553	0.000	-128.902	-65.375	0.000	-0.830	-0.238	0.000
12/F	455.749	26.083	0.000	-145.633	-74.489	0.000	-1.296	-0.355	0.000
11/F	580.704	26.819	0.000	-162.364	-79.508	0.000	-1.762	-0.436	0.000
10/F	705.658	26.763	0.000	-179.096	-80.433	0.000	-2.228	-0.481	0.000
09/F	842.465	29.215	0.000	-195.809	-92.707	0.000	-3.408	-0.745	0.000
08/F	978.996	31.606	0.000	-212.539	-104.989	0.000	-3.998	-0.880	0.000
07/F	1115.526	33.998	0.000	-229.268	-117.271	0.000	-4.587	-1.016	0.000
06/F	1252.057	36.390	0.000	-245.998	-129.553	0.000	-5.177	-1.151	0.000
05/F	1400.737	38.922	0.000	-262.700	-141.821	0.000	-7.116	-1.588	0.000
04/F	1548.851	41.329	0.000	-279.428	-154.101	0.000	-7.844	-1.755	0.000
03/F	1696.966	43.735	0.000	-296.156	-166.382	0.000	-8.571	-1.922	0.000
02/F	1872.598	48.090	0.000	-310.567	-178.171	0.000	-9.262	-2.079	0.000
01/F	1986.959	67.881	0.000	-314.099	-178.609	0.000	-9.886	-2.226	0.000

**Existing Wall Mark** - The list box is the listing of the existing wall marks.

You may search the desired wall mark using [incremental search](#) described in How to use **SADS** topic.

**Load Type Group Box :**

**Load Type** - Select Vertical Load from combo box.

**Direction** - It is disabled when you select Vertical Load.

**Loads Group Box :**

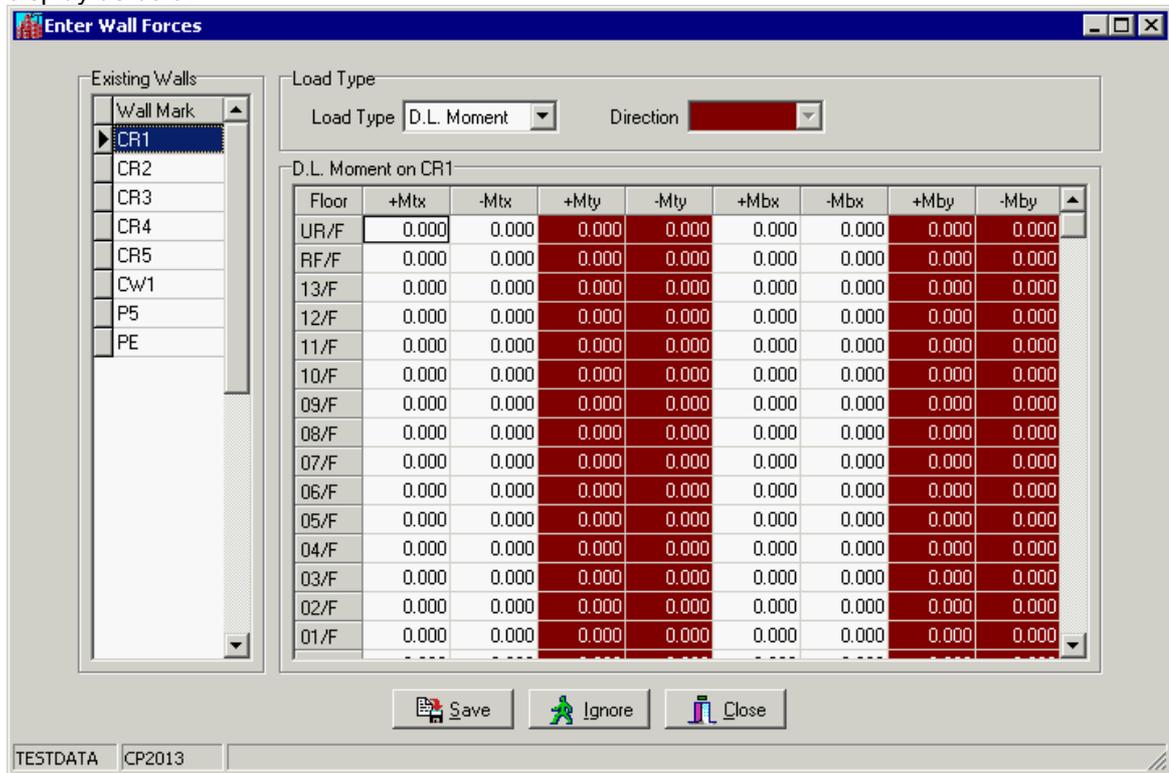
**D.L.** - Enter accumulated dead load (in kN) which applied to the selected wall in corresponding floor.

**L.L.(N)** - Enter accumulated non-permanent live load (in kN) which applied to the selected wall in corresponding floor.

- L.L.(P)** - Enter accumulated permanent live load (in kN) which applied to the selected wall in corresponding floor.
- Mgx(DL)** - Enter the gravity moment (in kN-M) due to dead load which applied to the selected wall on corresponding floor in X-X direction.
- Mgx(LL-N)** - Enter the gravity moment (in kN-M) due to non-permanent live load which applied to the selected wall on corresponding floor in X-X direction.
- Mgx(LL-P)** - Enter the gravity moment (in kN-M) due to permanent live load which applied to the selected wall on corresponding floor in X-X direction.
- Mgy(DL)** - Enter the gravity moment (in kN-M) due to dead load which applied to the selected wall on corresponding floor in Y-Y direction.
- Mgy(LL-N)** - Enter the gravity moment (in kN-M) due to non-permanent live load which applied to the selected wall on corresponding floor in Y-Y direction.
- Mgy(LL-P)** - Enter the gravity moment (in kN-M) due to permanent live load which applied to the selected wall on corresponding floor in Y-Y direction.

### 11.4.2 Enter Wall Local Moment

If the load type you select is "D.L. Moment" or "L.L. Moment", the Loads Group Box will be display as below.



**Load Type Group Box :**

- Load Type** - Select D.L. Moment, LL(N) Moment or LL(P) Moment from combo box.
- Direction** - It is disabled when you select above items.

**Loads Group Box :**

- +Mtx** - Enter local positive top end moment (in kN) on corresponding floor in X-X direction.
- Mtx** - Enter local negative top end moment (in kN) on corresponding floor in X-X direction.
- +Mty** - Enter local positive top end moment (in kN) on corresponding floor in Y-Y direction.
- Mty** - Enter local negative top end moment (in kN) on corresponding floor in Y-Y direction.
- +Mbx** - Enter local positive bottom end moment (in kN) on corresponding floor in X-X direction.
- Mbx** - Enter local negative bottom end moment (in kN) on corresponding floor in X-X direction.

- +Mby** - Enter local positive bottom end moment (in kN) on corresponding floor in Y-Y direction.
- Mby** - Enter local negative bottom end moment (in kN) on corresponding floor in Y-Y direction.

**Note:** You can enter these local moments when the bending is un-check in [Maintain Wall Data sub-command](#).

### 11.4.3 Enter Wall Lateral Load

If the load type you select is "wind load" or "soil load" or "dynamic load", the Loads Group Box will be display as below.

Floor	Vx	Vy	Mtx	My	Mbx	Mby	Mt	P
UR/F	46.506	-0.026	0.349	-0.016	149.168	-0.100	-32.765	-5.063
RF/F	34.943	0.347	40.580	-0.445	152.397	0.665	7.363	-33.898
13/F	96.686	0.349	-235.608	-0.365	73.787	0.751	-3.731	-117.025
12/F	109.104	0.029	-282.893	0.316	66.242	0.407	-15.212	-161.452
11/F	143.648	-0.058	-332.370	0.475	127.303	0.290	-13.055	-185.910
10/F	188.181	-0.197	-342.959	0.701	259.220	0.070	-13.955	-186.328
09/F	203.888	-0.229	-263.922	0.849	388.520	0.118	-20.021	-184.788
08/F	238.942	-0.406	-184.529	1.131	580.086	-0.167	-19.580	-177.754
07/F	265.308	-0.566	-47.197	1.319	801.790	-0.491	-20.465	-149.557
06/F	311.739	-0.726	82.226	1.443	1079.790	-0.880	-20.619	-102.274
05/F	312.844	-0.845	375.349	1.571	1376.450	-1.133	-24.509	-54.371
04/F	348.294	-1.062	607.127	1.797	1721.668	-1.602	-33.749	-0.740
03/F	339.726	-1.767	993.584	2.553	2080.708	-3.102	-11.158	115.164
02/F	452.173	-0.616	834.628	0.523	2643.320	-1.942	-27.278	234.875
01/F	466.007	-0.662	1645.232	0.677	3975.266	-2.635	-44.053	373.087

#### Load Type Group Box :

- Load Type** - Select Wind Load, Dynamic Load or Soil Load from combo box.
- Direction** - Select the direction of selected Lateral Load.

#### Loads Group Box :

- Vx** - Enter the value of the X-X shear (in kN) due to wind load in X-X direction.
- Vy** - Enter the value of the Y-Y shear (in kN) due to wind load in X-X direction.
- Mx** - Enter the value of the X-X bending moment (in kN-M) due to wind load in X-X direction.
- My** - Enter the value of the Y-Y bending moment (in kN-M) due to wind load in X-X direction.
- Mt** - Enter the value of the torsional moment (in kN-M) due to X-X direction wind load.
- P** - Enter the value of the axial load (in kN) due to X-X direction wind load.

## 11.5 Validate Wall Data Sub-command

The Validate Wall Data Sub-command is use to make a validation about the existing wall data you provided. **SADS** will print out or display all the incorrect data after finish the procedure.

When you choose Wall Validation from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Validate Wall Data as below.

No	First Wall	Last Wall	First Floor	Last Floor
1	CR1	PE	UR/F	BS/F
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "W".

**Print Jobs Group Box:**

**First Wall** - Use the combo box to select the beginning wall mark which is going to be validate.

**Last Wall** - Use the combo box to select the last wall mark of the validation.

**First Floor** - Use the combo box to select the top [floor code](#) of the selected wall.

**Last Floor** - Use the combo box select the last [floor code](#) of the selected wall.

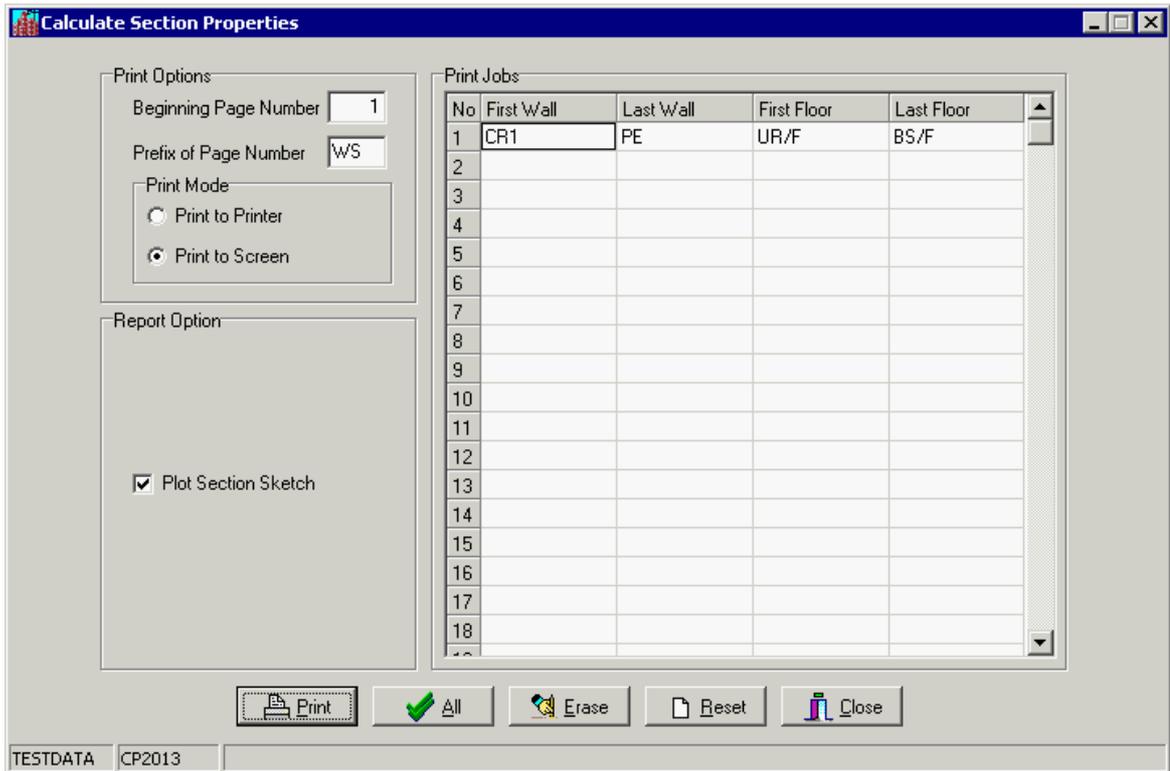
You may use [incremental search](#) to select the desired wall marks and floor codes.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.6 Wall Section Properties Sub-command

The Wall Section Properties Sub-command is use to calculate the section properties of walls. At mean time, **SADS** will print a report for the submission to B.D.. The report includes section area, position of section center and moment of inertia.

When you choose Wall Section Properties from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Calculate Wall Section Properties as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "WS".

**Print Jobs Group Box :** Refer to [Validate Wall Data Sub-command](#).

**Report Option Group Box :**

**Plot Section Sketch** - If you want to plot the section sketch in the report, check the check box, otherwise do not check the check box.

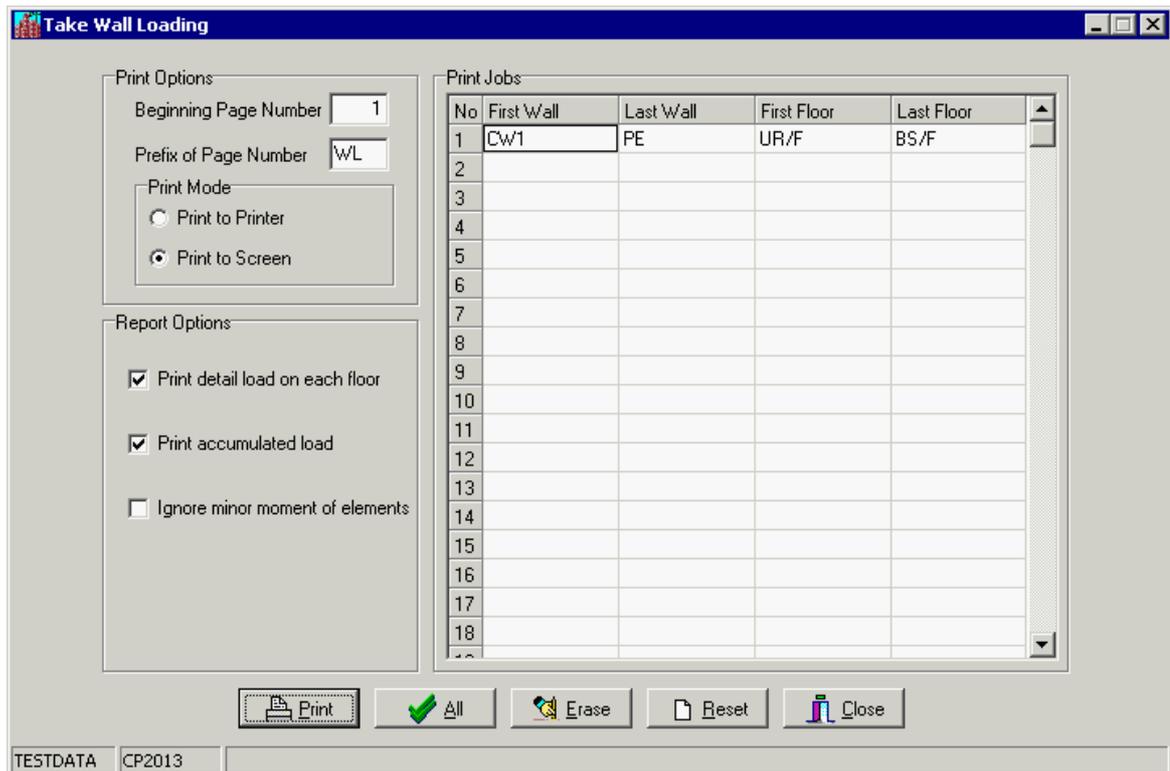
**Consider Shear Lag** - If you want to consider the effect of shear lag to section properties, you should check it, otherwise do not check the check box.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.7 Take Wall Loading Sub-command

The Take Wall Loading Sub-command is use to collect the accumulate vertical loads which applied to walls. At mean time, **SADS** will print a report for the submission to B.D.. The report consists of two parts, i.e., Wall loads data and accumulate vertical load data.

When you choose Wall Take Loading from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Take Wall Loading as below.



**Print Options Group Box** :Same as [Print Slab Report Sub-command](#), except the default page mark is "WL".

**Print Jobs Group Box** : Refer to [Validate Wall Data Sub-command](#).

#### Report Option Group Box :

**Print detail load on each floor**- Check the check box to print the detail of wall loads data on each floor.

**Print accumulate load** - Check the check box to print the accumulate vertical loads of the wall.

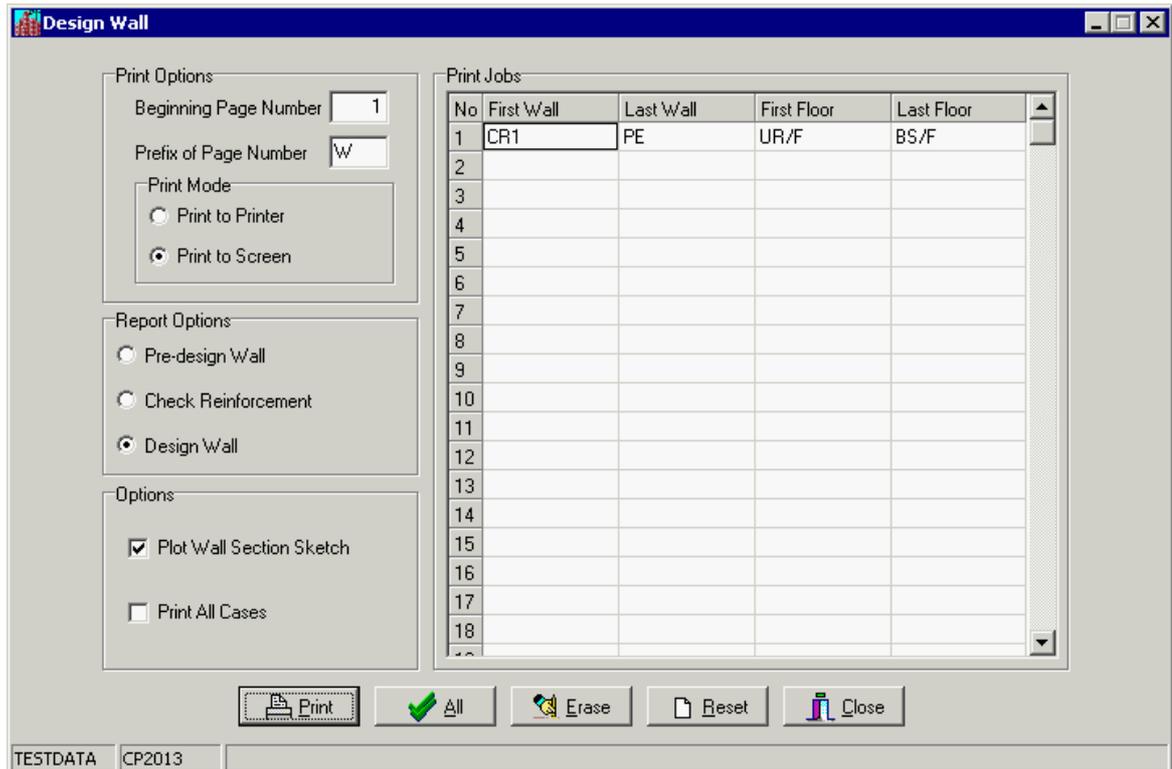
**Ignore minor moment of elements** - Check the check box to ignore moments along minor axis of wall elements when SADS distributes vertical load from core wall to sub-walls. Otherwise, un-check the check box.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.8 Design Wall Sub-command

The Design Wall Sub-command enables you to pre-design and design the walls.

When you choose Wall Design from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Wall Design as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "W".

**Print Jobs Group Box:** Refer to [Validate Wall Data Sub-command](#).

**Report Type Group Box:** Click the radio button and select Pre-design Wall or Design Wall.

**Pre-design Wall** - Click the radio button if you want to pre-design the wall. The function of pre-design are listed as below:

1. Calculate the reinforcement ratio of the vertical bar of the wall in each floor. **SADS** uses the information of wall section, wall loads and concrete mix of wall which previously supplied by the user combine with the biaxial bending method to perform the calculation. If the ratio is larger than maximum permissible value, **SADS** will give you an error message that appears as ###... You must amend the dimension of the wall section and follow the step which described in "[Get Start](#)" to repeat the procedure, until the ratio is okay!
2. At the same time, according to the result of reinforcement ratio, **SADS** defines the diameter and spacing of the vertical bars, horizontal bars and binders of the walls.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars without alter the sketch of wall sketch. **SADS** will generate a report if some of wall sections are under designed. Before you run this option, you must complete the pre-design of walls.

**Design Wall** - Click the radio button to print out the calculation of walls in the building for the submission to B.D. Before you run this option, you must complete the Pre-design of walls and edit the sketch of walls.

#### Options Group Box :

When you click the Check Reinforcement button, the Option Group Box has one check box only.

**Adjust Reinforcement** - Check this check box if you want to adjust the under designed reinforced bars automatically.

When you click the Design button, the Options Group Box will display the following option.

**Plot Wall Section Sketch** - Check the check box if you want to plot the wall section sketch on the wall design print out. otherwise do not check it. (for design option only).

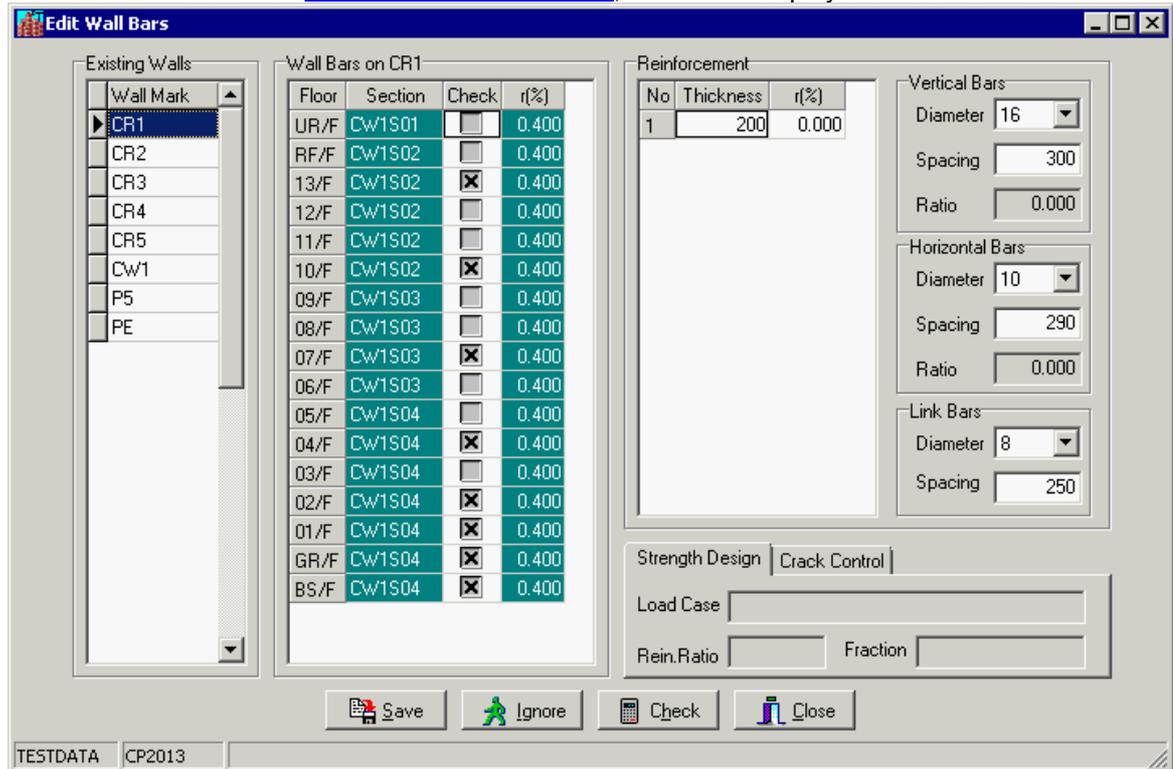
**Print All Cases** - Check the check box if you want to print the calculation results for all loading cases.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.9 Edit Wall Bar Sub-command

The Edit Wall Bar Sub-command allows you to edit the thickness, the vertical bars, the horizontal bars and the binders of wall which had been pre-designed and certainly all right.

When you choose Wall Bar Edit from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Edit Wall Bar as below.



Floor	Section	Check	r(%)
UR/F	Cw1S01	<input type="checkbox"/>	0.400
RF/F	Cw1S02	<input type="checkbox"/>	0.400
13/F	Cw1S02	<input checked="" type="checkbox"/>	0.400
12/F	Cw1S02	<input type="checkbox"/>	0.400
11/F	Cw1S02	<input type="checkbox"/>	0.400
10/F	Cw1S02	<input checked="" type="checkbox"/>	0.400
09/F	Cw1S03	<input type="checkbox"/>	0.400
08/F	Cw1S03	<input type="checkbox"/>	0.400
07/F	Cw1S03	<input checked="" type="checkbox"/>	0.400
06/F	Cw1S03	<input type="checkbox"/>	0.400
05/F	Cw1S04	<input type="checkbox"/>	0.400
04/F	Cw1S04	<input checked="" type="checkbox"/>	0.400
03/F	Cw1S04	<input type="checkbox"/>	0.400
02/F	Cw1S04	<input checked="" type="checkbox"/>	0.400
01/F	Cw1S04	<input checked="" type="checkbox"/>	0.400
GR/F	Cw1S04	<input checked="" type="checkbox"/>	0.400
BS/F	Cw1S04	<input checked="" type="checkbox"/>	0.400

No	Thickness	r(%)
1	200	0.000

**Existing Wall Mark Group Box :** The list box is the listing of the existing wall marks which have previously created. If you wish to edit the reinforced bars of existing wall, click the wall mark and edit it. You may search the desired wall mark using [incremental search](#) described in How to use **SADS** topic.

**Wall Bars Group Box :** The "Floor Code", "Section Code" and "Check" are abstracted from the data base. Only the "Check" information is changeable, you can amend it as your desired. The reinforcement ratio (r%) is the result of wall pre-design, it is not changeable.

**Reinforcement Group Box :** All Diameter and Spacing of this group box are changeable, you may click the edit box or Combo box to enter the value.

**Thickness** - Indicates the different thickness of wall section elements which you supplied before.

**Vertical Bars group** - This group indicate the vertical bar of the selected wall thickness. It includes the diameter of the vertical bar, the spacing between the vertical bars and the ratio of actual area and required area (in %) of the vertical bars. As mention above, you may change the diameter and the spacing. If the area is not enough after you changed, **SADS** will give the warning in the "Ratio" field. If the spacing you changed is not satisfied the defined value of the [Wall page of Master data Sub-command](#), **SADS** will give the warning in the "Spacing" field.

**Horizontal Bars group** - Same as above, this group is the horizontal bar of the selected wall thickness, it include the diameter of the horizontal bar, the spacing between the horizontal bars and the ratio of actual area and required area (in %) of the horizontal bars. You

may change the diameter and the spacing. If the area is not enough after you changed, **SADS** will give the warning in the "Ratio" field. If the spacing you changed is not satisfied the defined value of the [Wall page of Master data Sub-command](#), **SADS** will give the warning in the "Spacing" field.

**Link Bars group** - This group include the diameter of the link bar, the spacing between the link bars of the selected wall thickness. Same as above, you may change the diameter and the spacing. If the spacing you changed is not satisfied the defined value of the [Wall page of Master data Sub-command](#), **SADS** will give the warning in the "Spacing" field.

**Smallest Fraction** - If you change the reinforced bars of wall, you may click the Check button, **SADS** will check the wall section according to new reinforced bars and display the critical fraction in the group box.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.10 Wall Force and Moment Sub-command

The Wall Force and Moment Sub-command is use to print out the calculation result of total axial loads and total bending moments on every wall's element inside wall section for design the pile cap or transfer plate under the wall section.

When you choose Wall Force and Moment from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Wall Force and Moment as below.

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "WF".

### Print Jobs Group Box:

**Wall Mark** - - Enter or use the combo box to select the wall mark which is going to be calculate.

**Floor Code** - Use the combo box to select the [floor code](#) of the selected wall.

**Ignore minor moment of elements** - Check the check box to ignore moments along minor

axis of wall elements. Otherwise, un-check the check box.

**Loading** - Check the check boxes to select the loading that you want calculate.

You may use [incremental search](#) to select the desired wall marks and floor codes.

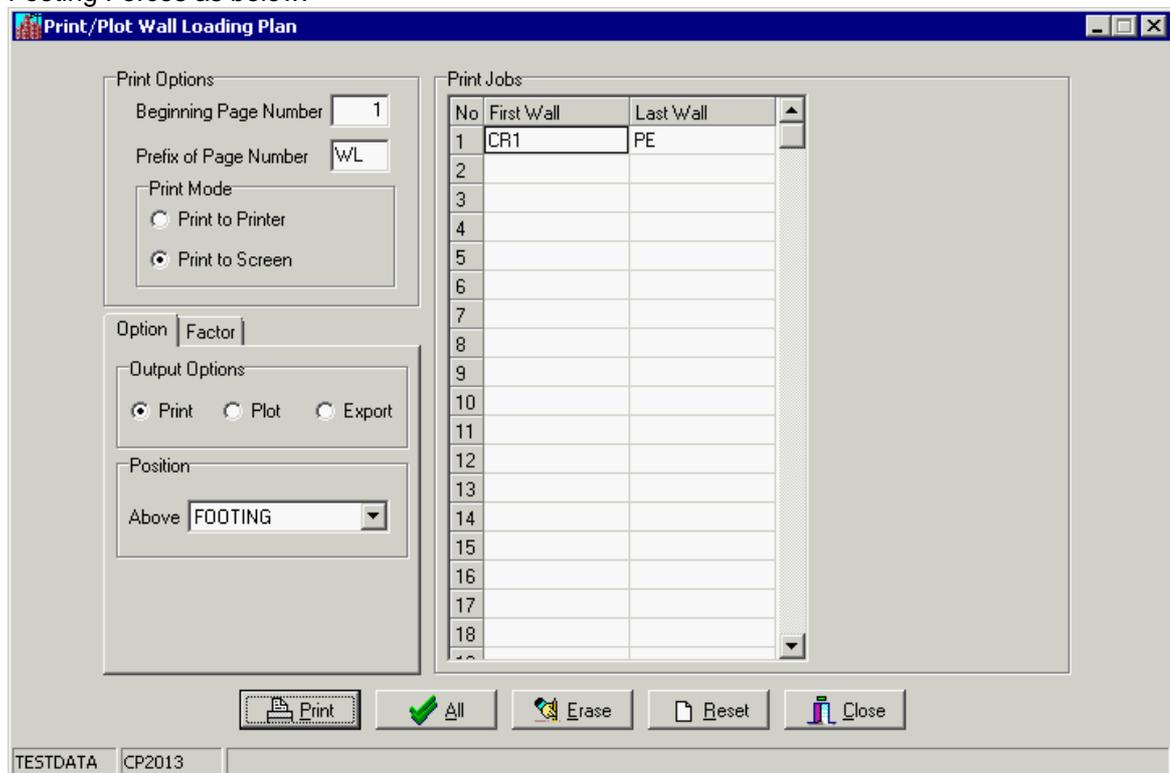
**Report Option Group Box** : Enter the significant number after decimal point.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 11.11 Wall Loading Plan Sub-command

The Wall Loading Plan Sub-command is use to print, display or plot loading plan of the existing columns for checking or for the reference of foundation design of the building.

When you choose Wall Loading Plan from Wall Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Footing Forces as below.



No	First Wall	Last Wall
1	CR1	PE
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "WL".

**Print Jobs Group Box:** Refer to [Print Wall Report Sub-command](#).

**Output Options Group Box** : Refer to [Column Loading Plane Sub-command](#).

**Position Group Box** : Refer to [Column Loading Plane Sub-command](#).

**Factors Group Box:** Refer to [Column Loading Plane Sub-command](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

If you select plot option in output options group box, **SADS** will display a preview window as described in [Column Loading Plane Sub-command](#).

## 12 Lintel Beam Command

### 12.1 About Lintel Beam Command

The Lintel Beam Module allows you to calculate the reinforcement of lintel beam in the building. You may supply the lintel beam data and the vertical loads which applied to lintel beams, **SADS** will print out a report for the submission to B.D.. Besides, **SADS** offer the edit function in this module, allows you to edit the reinforced bars of lintel beams to meet your needs.

When you choose Lintel command from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button, the lintel beam sub-command buttons are display as below.



The Sub-commands are:

1. Maintain Lintel Data Sub-command.
2. Print Lintel Report Sub-command.
3. Enter Lintel Forces Sub-command.
4. Validate Lintel Data Sub-command.
5. Design Lintel Sub-command.
6. Edit Lintel Bars Sub-command.

## 12.2 Maintain Lintel Data Sub-command

### 12.2.1 Maintain Lintel Beam Data (3 Dimension)

The Maintain Lintel Beam Data sub-command is use to create a new lintel beam data or edit existing lintel beam data and supply the vertical loads or amend existing loads of lintel beam data.

When you choose Maintain Lintel Beam Data from Lintel Command or click  button on

[Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Maintain Lintel Beam Data window.

The Maintain Lintel Beam Data sub-command have two pages.

1. Lintel Beam Data Page.
2. Lintel Beam load Page.

If the Method you use is the "Three Dimension Method", the Lintel Beam Data Page is as below.

**Maintain Lintel Data**

Lintel Data | Lintel Load

Existing Data

Lintel Mark

- LB1
- LB2
- LB3

Control Data

Lintel Mark: LB1

Left X: 7.000 Y: 9.000

Right X: 8.000 Y: 9.000

Design Method

Classical Method  Auto Generate

Three Dim Method

Lintel Data

Floor	t(mm)	L(M)	B(mm)	D(mm)	Cov(mm)	Check	Load Code
08/F	200	1.000	200	500	25	<input type="checkbox"/>	LB1L04
07/F	200	1.000	200	500	25	<input checked="" type="checkbox"/>	LB1L04
06/F	200	1.000	200	500	25	<input type="checkbox"/>	LB1L04
05/F	200	1.000	200	500	25	<input checked="" type="checkbox"/>	LB1L04
04/F	200	1.000	200	500	25	<input type="checkbox"/>	LB1L04
03/F	200	1.000	200	500	25	<input checked="" type="checkbox"/>	LB1L04
02/F	250	1.000	250	500	25	<input checked="" type="checkbox"/>	LB1L05
01/F	250	1.000	250	500	25	<input checked="" type="checkbox"/>	LB1L06
GR/F	250	1.000	250	500	25	<input checked="" type="checkbox"/>	LB1L08
RS/F	0						

Vehicle Load Info on GR/F

Load Class: 6B Loaded Length: 1.000 Distributed qk: 13.900

Buttons: Add, Insert, Delete, Copy, Framing, Save, Ignore, Close

TESTDATA CP2013

**Existing Lintel Beam Mark Group box :** Indicate the listing of the existing lintel beam marks which have previously created. You may search the desired Lintel beam mark using

[incremental search](#) described in How to use **SADS** topic. There is a  button under the box, so you can rearrange the order of the existing wall marks, followed the steps of [re-arrange marks](#) in How to use **SADS** topic..

#### Control Data Group Box :

**Lintel Mark** - Enter alphanumerical up to 8 characters long for lintel beam mark.

**Located at Wall** - Enter the wall mark where the lintel beam located.

**Design Method** - Click the radio button and select the "Classical Method" or "Three Dimension Method" you use.

**Auto Generate** - If the wall data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input wall data manually, you don't check this check box.

**Lintel Beam Data Group box :** The following information is for "Three Dimension Method".

**Floor** - The [floor code](#) of the building.

**t(mm)** - Enter the thickness of wall (in mm) where the lintel beam located.

**L(M)** - Enter the span (in M) of lintel beam.

**B(mm)** - Enter the width (in mm) of the lintel beam section.

**D(mm)** - Enter the depth (in mm) of the lintel beam section.

**Cover(mm)** - Enter the concrete cover (in mm) of lintel beam.

**Check** - Check the check box if you want to check the section of the lintel beam on this floor.

**Load Code** - Enter up to 8 characters long for the name of vertical load code of lintel beam

#### Vehicle Load Info on XXXX Group Box:

**Load Class** - There are 5 options you can select.

- N/A
- 6B
- 6D
- 6C
- 6E

If you select the N/A option, the loaded length and distributed qk data are not necessary. These 2 edit boxes are disabled. Otherwise, you need to provide the following data.

**Loaded Length** - Enter the data according the appendix B item #9 of CoP 2011.

**Distributed qk** - For Class 6B to 6D, the data is calculated according with formulas in Appendix C of taken from Table 3.6 of CoP 2011. For Class 6E, this data is calculated using formulas in Clause 2.10.1 of SDM.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 12.2.2 Maintain Lintel Beam Data (Classical)

If the Method you use is the "Classical Method", **SADS** will display the Lintel Beam Data Page as below.

**Existing Lintel Beam Mark Group box** : Same as Three Dimension method.

### Control Data Group Box :

**Lintel Mark** - Enter alphanumeric up to 8 characters long for lintel beam mark.

**Located at Wall** - Enter the wall mark where the lintel beam located.

**Design Method** - Click the radio button and select the "Classical Method" or "Three Dimension Method" you use.

**Direction** - Click the radio button and select "X-X", if the span of lintel beam is at X-X direction of wall coordinates. Select "Y-Y", if the span of lintel beam is at Y-Y direction of wall coordinates.

**Auto Generate** - If the wall data is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input wall data manually, you don't check this check box.

**Lintel Beam Data Group Box** : The following information is for "Classical Method".

**Floor** - The [floor code](#) of the building.

**Floor Name** - Click the radio button and enter the description of corresponding floors which the lintel beam should be calculated. If there is no lintel beam on the specific floor, you may skip the row.

**t** - Enter the thickness of wall (in mm) where the lintel beam located.

**T** - Enter the total thickness of wall's webs (in mm) which parallel to the axis of lintel beam.

**X** - Enter the x-distance (in M) of mid point of lintel beam span to the X-axis of wall coordinates.

**Y** - Enter the y-distance (in M) of mid point of lintel beam span to the Y-axis of wall coordinates.

**L** - Enter the span (in M) of lintel beam.

**B** - Enter the width (in mm) of the lintel beam section.

**D** - Enter the depth (in mm) of the lintel beam section.

**Cover** - Enter the concrete cover (in mm) of lintel beam.

**Kt** - Enter the value of Coefficient of torsional stress, it's value should be calculated from:

$$K_t = \frac{\tau \times t}{M_t}$$

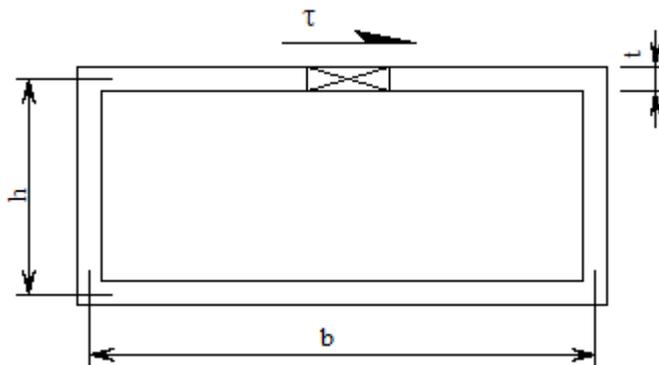
Where:

$\tau$  is the shear stress, it's formula can be found from Designer's Handbook;

**t** is the thickness of wall where lintel is located;

**Mt** is the torsional moment of core wall.

Example:



$$\tau = \frac{M_t}{2bht}$$

$$K_t = \frac{\tau \times t}{M_t} = \frac{1}{2bh}$$

**Load Code** - Enter up to 8 characters long for the name of vertical load code of lintel beam.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 12.2.3 Maintain Lintel Beam Load

Click the Lintel Beam Load Code Page, **SADS** will display the Lintel Beam Load Code Page as below. The Lintel Beam Load Code Page allows you to supply the Load Code data you created in the Maintain Lintel Beam Data Page or amend the loading of existing load code.

No	Name	Type	Attr	Flag	D.L.	LL(N)	LL(P)	a(M)	b(M)	c(M)	Auto
1	RS4	0	S		0.500						X
2		0									
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											

**Existing Lintel Beam Load Code Group box :** Indicate the listing of the existing lintel beam load code that created at above page. You may search the desired Lintel beam load code using [incremental search](#) described in How to use **SADS** topic.

**Header Data Group Box :** Enter the load code which you want to supply vertical loads data in it.

**Lintel Loads Group box :**

**Name** - Enter the name of load. If it is slab or beam, the load name must be exactly same as the slab mark or beam mark which have been previously defined in the framing plain

**Load Type** - Enter the type of load which applied on the lintel beam. **SADS** defined the loading type as followed:

- 0 -- uniformly distributed load on full span, unit: kN/M.
- 1 -- concentrated load, unit: kN.
- 2 -- uniformly distributed load, unit: kN/M.
- 3 -- triangular distributed load, unit: kN/M.
- 4 -- trapezoidal distributed load, unit: kN/M.
- 5 -- right triangular distributed load, unit: kN/M.
- 6 -- right triangular distributed load, unit: kN/M.
- 7 -- concentrated moment load, unit: kN- M.

**Attribute** - Click the combo box and select the source of loading. "B" denotes beam, "S" denotes slab, "C" denotes column, **SADS** will automatically extracts the reactions upon them. If you do not want **SADS** automatically extracts the reactions, select blank " ", then you may enter the dead load and live load of the loading in the appropriate box.

**Flag** - Click the combo box and select the characteristic of the loading. For beam, you may select "R" "L", "R" denotes right hand side reaction, "L" denotes left hand side reaction. For slab in 8110, you may select "C" "D", "C" denotes continuous slab, "D" denotes discontinuous slab.

**D.L.** - Enter the value of dead load.

**LL(N)** - Enter the value of non-permanent live load.

**LL(P)** - Enter the value of permanent live load.

- a - Enter the value of the distance from the left end of lintel beam to the position of concentrated load or the beginning of distributed load, unit: M.
- b - Enter the value of the length of distributed load, unit: M.
- c - Enter the value of the length of the triangular part of trapezoidal distributed load, unit M.
- Auto** - If the lintel load is generated by [Generate SADS Data Sub-command](#), the check box is checked automatically. If you input lintel load manually, you don't check this check box.

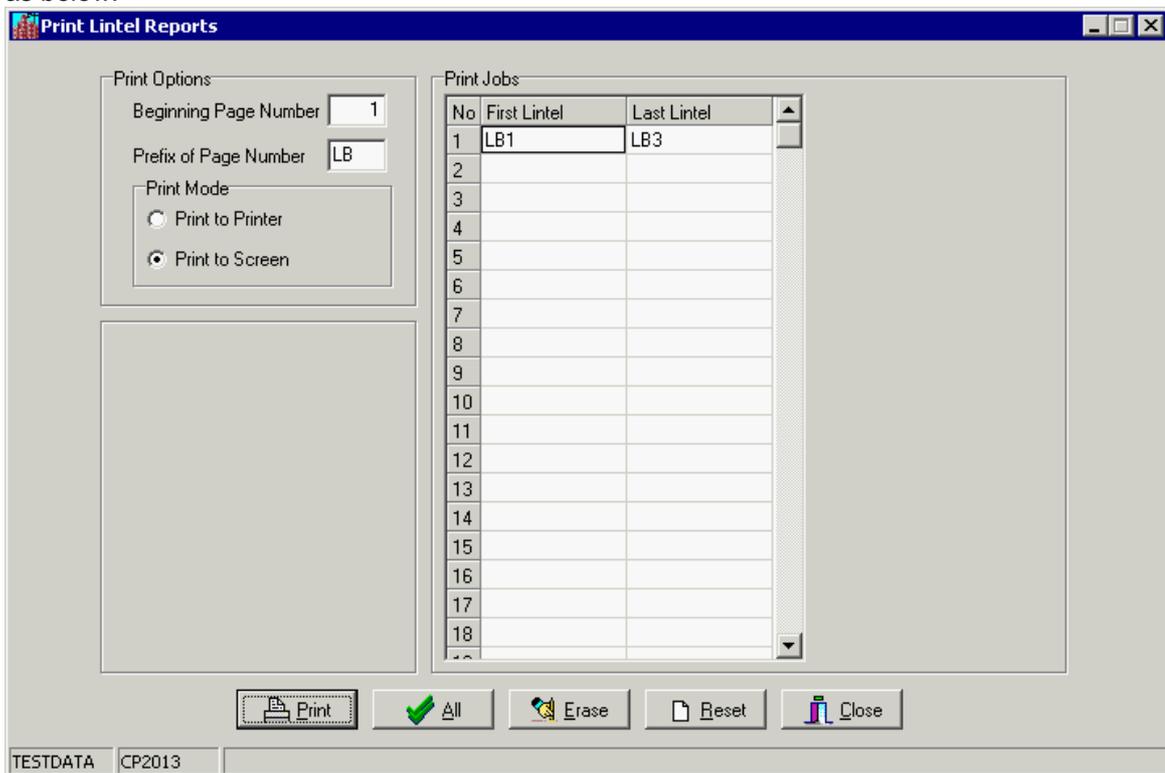
Refer to the figure of [Beam Data Sub-command](#) for the graphically explanation of above load type and the relevant dimensions a, b and c.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 12.3 Print Lintel Report Sub-command

The Print Lintel Reports Sub-command allows you to print out or display the lintel beams data for checking purpose.

When you choose Lintel Reports from Lintel Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Lintel Reports as below.



**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "LB".

**Print Jobs Group Box:**

**First Lintel Mark** - Click the combo box to select the beginning lintel beam mark which going to be reported.

**Last Lintel Mark** - Click the combo box to select the last lintel beam mark which going to be reported.

You may use [incremental search](#) to select the desired lintel beam marks.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

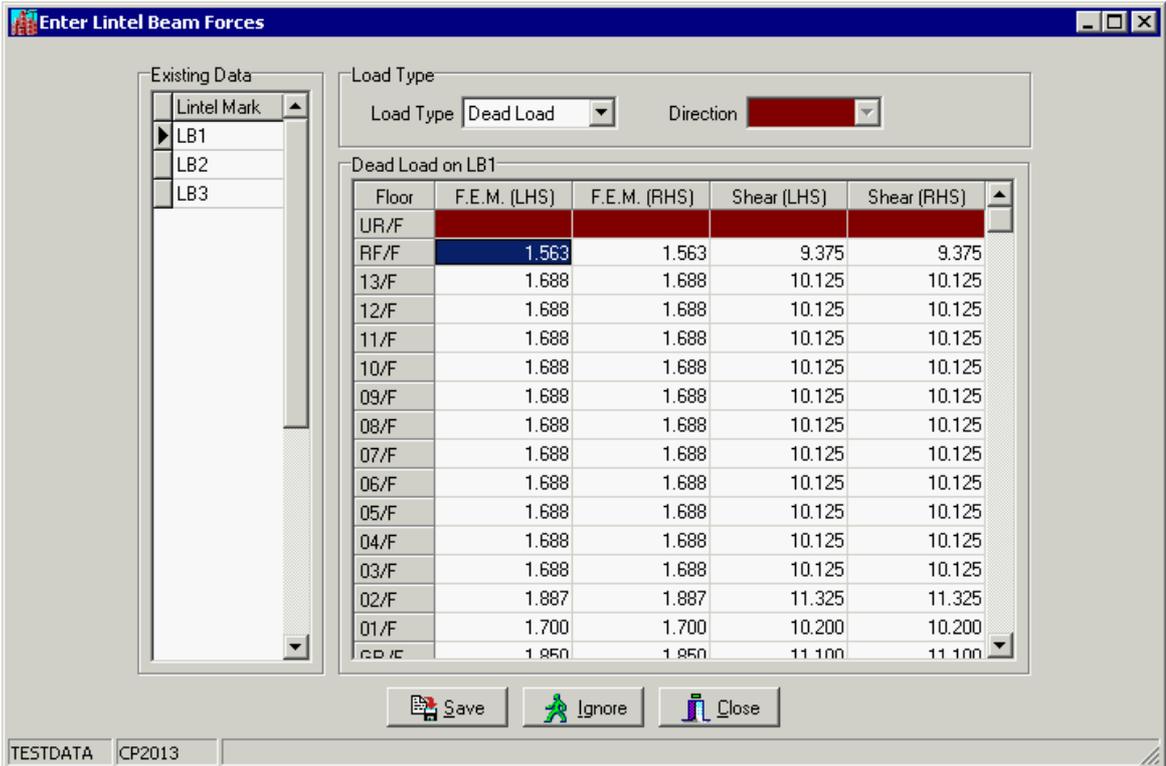
## 12.4 Enter Lintel Forces Sub-command

### 12.4.1 Enter Lintel Beam Vertical Load

The Enter Lintel Force Sub-command allows you to enter forces of beams manually. If you do not want to use the result of **SADS** to calculate the beams forces, or if you wish to use some result of beams for any purposes, you may use this Sub-command to enter the vertical loads, wind moments, soil moments and dynamic moments of beams.

When you choose Lintel Enter Force from Lintel Command or click  button on [Command](#)

[Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Enter Beam Force as below.



Floor	F.E.M. (LHS)	F.E.M. (RHS)	Shear (LHS)	Shear (RHS)
UR/F				
RF/F	1.563	1.563	9.375	9.375
13/F	1.688	1.688	10.125	10.125
12/F	1.688	1.688	10.125	10.125
11/F	1.688	1.688	10.125	10.125
10/F	1.688	1.688	10.125	10.125
09/F	1.688	1.688	10.125	10.125
08/F	1.688	1.688	10.125	10.125
07/F	1.688	1.688	10.125	10.125
06/F	1.688	1.688	10.125	10.125
05/F	1.688	1.688	10.125	10.125
04/F	1.688	1.688	10.125	10.125
03/F	1.688	1.688	10.125	10.125
02/F	1.887	1.887	11.325	11.325
01/F	1.700	1.700	10.200	10.200
00/F	1.850	1.850	11.100	11.100

**Existing Lintel Beam Mark Group box :** Indicate the listing of the existing lintel beam marks which have previously created.

You may search the desired Lintel beam mark using [incremental search](#) described in How to use **SADS** topic.

#### Load Type Group Box :

**Load Type** - Select Dead Load or Live Load from combo box.

**Direction** - It is disabled when you select Dead Load or Live Load.

**Loads Group Box :** If you select dead load or live load, the loads group box is as above figure.

**F.E.M.** - Indicates the fixed end moments of beam due to the vertical loads condition (in kN-M), the followed symbol (LHS) means left hand side, and (RHS) means right hand side. You may enter the value.

**Shear** - Indicates the shear of beam due to the vertical loads condition (in kN-M), the followed symbol (LHS) means left hand side, and (RHS) means right hand side. You may enter the value.

## 12.4.2 Enter Lintel Beam Lateral Load

If you select wind load, soil load or dynamic load, the loads group box is as below figure.

Floor	M(LHS)	M(RHS)	V
UR/F			
RF/F	0.065	-0.459	-0.524
13/F	15.375	-15.147	-30.521
12/F	23.418	-23.561	-46.979
11/F	26.882	-26.705	-53.587
10/F	34.153	-34.056	-68.208
09/F	44.532	-44.104	-88.636
08/F	51.447	-50.744	-102.191
07/F	57.479	-56.861	-114.340
06/F	63.900	-63.030	-126.931
05/F	74.943	-74.151	-149.094
04/F	80.377	-78.505	-158.881
03/F	79.834	-79.757	-159.591
02/F	95.239	-91.984	-187.223
01/F	147.733	-169.296	-317.029

### Load Type Group Box :

**Load Type** - Select Wind Load, Dynamic Load or Soil Load from combo box.

**Direction** - Select the direction of selected Lateral Load.

### Loads Group Box :

**M(LHS)** - Indicates the bending moment due to selected of lateral load condition (in kN-M), the followed symbol (LHS) means left hand side. Enter the value in it.

**M(RHS)** - Indicates the bending moment due to selected of lateral load condition (in kN-M). RHS means right hand side. Enter the value in it.

**V** - Indicates the shear of lintel beam (in kN) due to selected of lateral loads. Enter the value in it.

## 12.5 Validate Lintel Data Sub-command

The Validate Lintel Data Sub-command is use to make a validation about the lintel beam data you provided. **SADS** will print a report and list all the incorrect data when finish the procedure.

When you choose Lintel Validation from Lintel Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Validate Lintel Beam Data as below.

No	First Lintel	Last Lintel	First Floor	Last Floor
1	LB1	LB3	UR/F	BS/F
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "LB".

**Print Jobs Group Box:**

- First Lintel Mark** - Click the combo box to select the beginning lintel beam mark to validated.
- Last Lintel Mark** - Click the combo box to select the last lintel beam mark to validated.
- First floor** - Click the combo box and select the first [floor code](#) of the lintel beam for validation.
- Last floor** - Click the combo box and select the first [floor code](#) of the lintel beam for validation. You may use [incremental search](#) to select the desired lintel beam marks and floor codes.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 12.6 Design Lintel Sub-command

The Design Lintel Sub-command enables you to pre-design and design the beams.

When you choose Lintel Design from Lintel Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Lintel Beam Design as below.

No	First Lintel	Last Lintel	First Floor	Last Floor
1	LB1	LB3	UR/F	BS/F
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

**Print Options Group Box:** Same as [Print Slab Report Sub-command](#), except the default page mark is "LB".

**Print Jobs Group Box:** Refer to [Validate Lintel Beam Data Sub-command](#).

**Report Type Group Box:** Click the radio button and select the Pre-design Lintel Beam or Design Lintel Beam.

**Pre-design Lintel Beam** - Click the radio button if you want to pre-design the lintel beam. It is use to calculate the reinforced ratio of lintel beam in the corresponding floor and provides the diameter and number of reinforced bar according to the calculation result. If the reinforced ratio is over the maximum permissible value, **SADS** will give a value of ### to prompt you edit the corresponding data. Before invoke this program, you must finish pre-design of slabs, pre-design of beams, calculate wall forces and calculate section properties of walls.

**Check Reinforcement** - Click the radio button if you want to check the reinforced bars of lintel beam and don't want to alter the bar sketch that generated by pre-design option and edited by you. **SADS** will generate a report if some of lintel beam sections are under designed. Before you run this option, you must make sure all lintel beams have been pre-designed before. If you check the Adjusting Bars / Stirrups check box, all under designed reinforced bars will be increased automatically.

**Design Beam** - Click the radio button to print out the calculation of lintel beams in the building for the submission to B.D. Before you run this option, you must complete the Pre-design of lintel beams and edit the sketch of lintel beams.

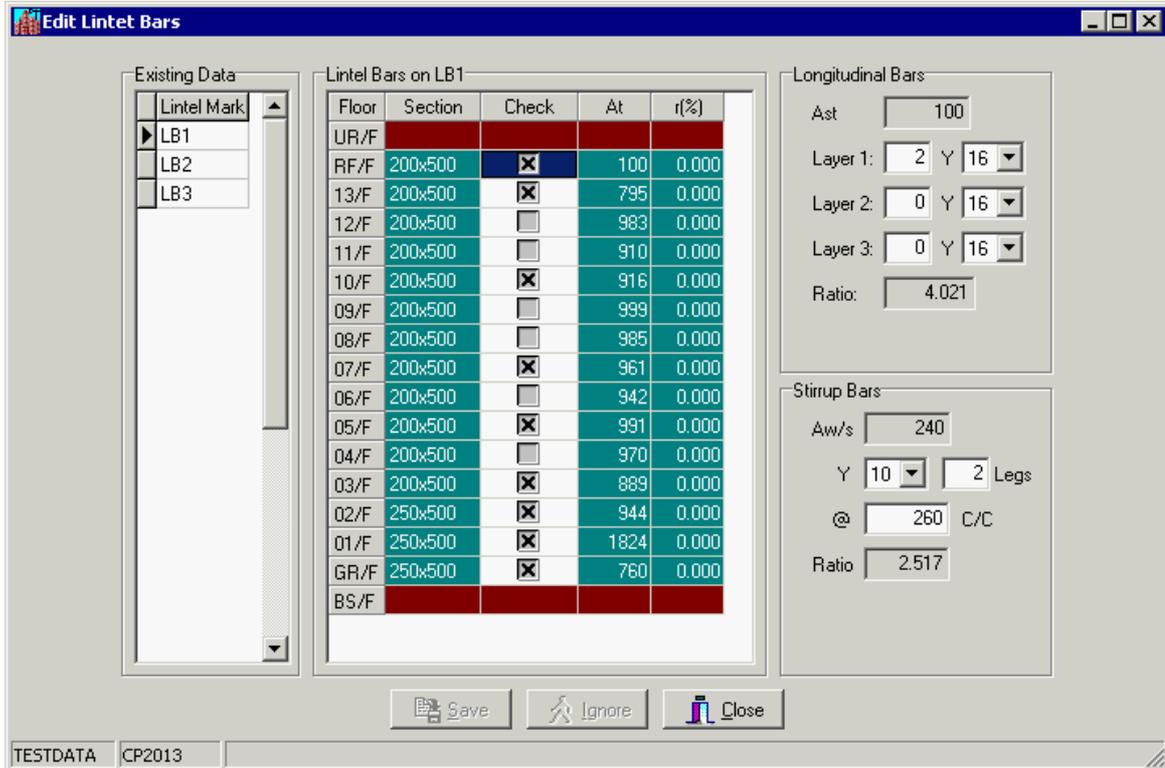
**Options Group Box:** If you select Check Reinforcement option, there is a Check Reinforcement check box in this group box. If you want to adjust the under designed reinforced bars automatically, you can check this check box..

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 12.7 Edit Lintel Bar Sub-command

The Edit Lintel Bar Sub-command allows you to edit the reinforced bars of lintel beams which had been pre-designed and certainly all right.

When you choose Lintel Bar Edit from Lintel Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Edit Lintel Bar as below.



Floor	Section	Check	At	r(%)
UR/F				
RF/F	200x500	<input checked="" type="checkbox"/>	100	0.000
13/F	200x500	<input checked="" type="checkbox"/>	795	0.000
12/F	200x500	<input type="checkbox"/>	983	0.000
11/F	200x500	<input type="checkbox"/>	910	0.000
10/F	200x500	<input checked="" type="checkbox"/>	916	0.000
09/F	200x500	<input type="checkbox"/>	999	0.000
08/F	200x500	<input type="checkbox"/>	985	0.000
07/F	200x500	<input checked="" type="checkbox"/>	961	0.000
06/F	200x500	<input type="checkbox"/>	942	0.000
05/F	200x500	<input checked="" type="checkbox"/>	991	0.000
04/F	200x500	<input type="checkbox"/>	970	0.000
03/F	200x500	<input checked="" type="checkbox"/>	889	0.000
02/F	250x500	<input checked="" type="checkbox"/>	944	0.000
01/F	250x500	<input checked="" type="checkbox"/>	1824	0.000
GR/F	250x500	<input checked="" type="checkbox"/>	760	0.000
BS/F				

**Existing Lintel Beam Mark Group box :** Indicate the listing of the existing lintel beam marks which have previously created. If you wish to edit the reinforced bars of existing lintel beam, click the lintel beam mark and edit it.

You may search the desired Lintel beam mark using [incremental search](#) described in How to use SADS topic.

**Lintel Bars Group Box :** The information of this group box are unchangeable.

**Section** - Indicate the lintel beam section. Refer to [Maintain Lintel Beam Data sub-command](#). B and D are the lintel beam section.

**Check** - If you use Three Dimension Method to calculate the lintel beam, you may check the check box when you want to check the section of the lintel beam on this floor. Otherwise, this field could not be altered.

**At** - Indicate the required area of reinforced bars, unit: mm<sup>2</sup>. This field could not be altered.

**r%** - Indicate the reinforcement ratio. It is the result of lintel beam pre-design.

**Longitudinal Bars Group Box :**

**Ast** - Indicate the required area of reinforced bars, unit: mm<sup>2</sup>. This field could not be altered.

**Layer 1, 2 & 3** - Indicate the layer of reinforced bars, SADS defined the upper part and lower part of the reinforced bar in lintel beam has the same value. The notation of bar like "2 Y 16" means the number of bars are 2, and the diameter of bars are 16 mm., Y indicates high tensile bar. You may edit these values to meet your requirement.

**Ratio** - Indicates the ratio of actual area and required area of Longitudinal reinforced bars.

This field could not be altered. When you edit the reinforced bars of above layer, SADS will instantly provide this value. If the value is less than 1, SADS gives you a warning, you must adjust those value again.

**Stirrups Group Box :**

**Aw/s** - Indicates the required area of stirrup, unit: mm<sup>2</sup>/M. This field could not be altered.

**Stirrup information** - "R10 2 @270" is the stirrup of the lintel beam. R denotes mild steel bar, 10 is the diameter (in mm) of stirrup, 2 denotes the number of stirrups, 270 is the space value (in mm) between two stirrups. You may modify these values to meet your requirement.

**Ratio** - Indicate the ratio of actual area and required area of stirrup. This field could not be altered. Same as the ratio of Longitudinal reinforced bars, when the value is less than 1, **SADS** gives you a warning and you must adjust those value again.

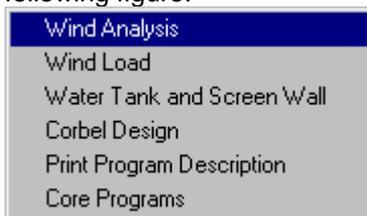
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 13 Miscellaneous Command

### 13.1 About Miscellaneous Command

In the Miscellaneous Command you can calculate the force coefficient of the building and the lateral loads of sub-structure due to the effect of wind, to evaluate the thickness and reinforced bar of screen wall & tank wall, to calculate the reinforced bar of corbel and so on.

When you choose Miscellaneous from Module menu, the pull down menu is illustrated as following figure.



Or when you click  button on [Command Button Bar](#), the miscellaneous sub-command buttons are display as below.



The Sub-commands are:

1. Wind Analysis Sub-command.
2. Wind Load Sub-command.
3. Water Tank and Screen Wall Sub-command.
4. Corbel Design Sub-command.
5. Print Description Sub-command.
6. Core Programs Sub-command.

### 13.2 Wind Analysis Sub-command

The Wind Analysis sub-command is use to calculate the force coefficient of the building due to the effect of wind. The formula which adopts by **SADS** is according to "Code of Practice On Wind Effects HONG KONG 2004". **SADS** will offer a calculation report of such result for the submission to B.D..

When you choose Wind Analysis from Miscellaneous Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Wind Analysis as below.

#### Building Parameters Group box :

**Wind Direction** - Select the wind direction from the combo box.

**Building Height** - Enter the height of the building (in M) above the site-ground level in the immediate vicinity of the building.

**Building Breadth** - Enter the dimension (in M) of the building perpendicular to the selected wind direction.

**Building Depth** - Enter the dimension (in M) of the building parallel to the selected wind direction.

**Site Ground Level** - Enter the site ground level of the building.

**Top Floor Code** - Click the combo box and select the top [floor code](#) of the building which should be calculated in Structural Analysis Command.

**Consider Dynamic Effect** - Check the check box if you want to consider the dynamic effect according section 7 of Code of Practice on Wind Effects in Hong Kong 2004.

#### Force Coefficient of Building Group box :

**Calculated** - After you click the Calculate button, **SADS** will calculate the force coefficient and display in the edit box.

**Use** - You may adjust the calculated force coefficient manually in the edit box. **SADS** will use the adjusted force coefficient to calculate the wind load in [Wind Load Sub-command](#).

#### Dynamic Magnification Factor Group box :

**Calculated** - After you click the Calculate button and you check the Consider Dynamic Effect check box, **SADS** will calculate the dynamic magnification factor and display in the edit box.

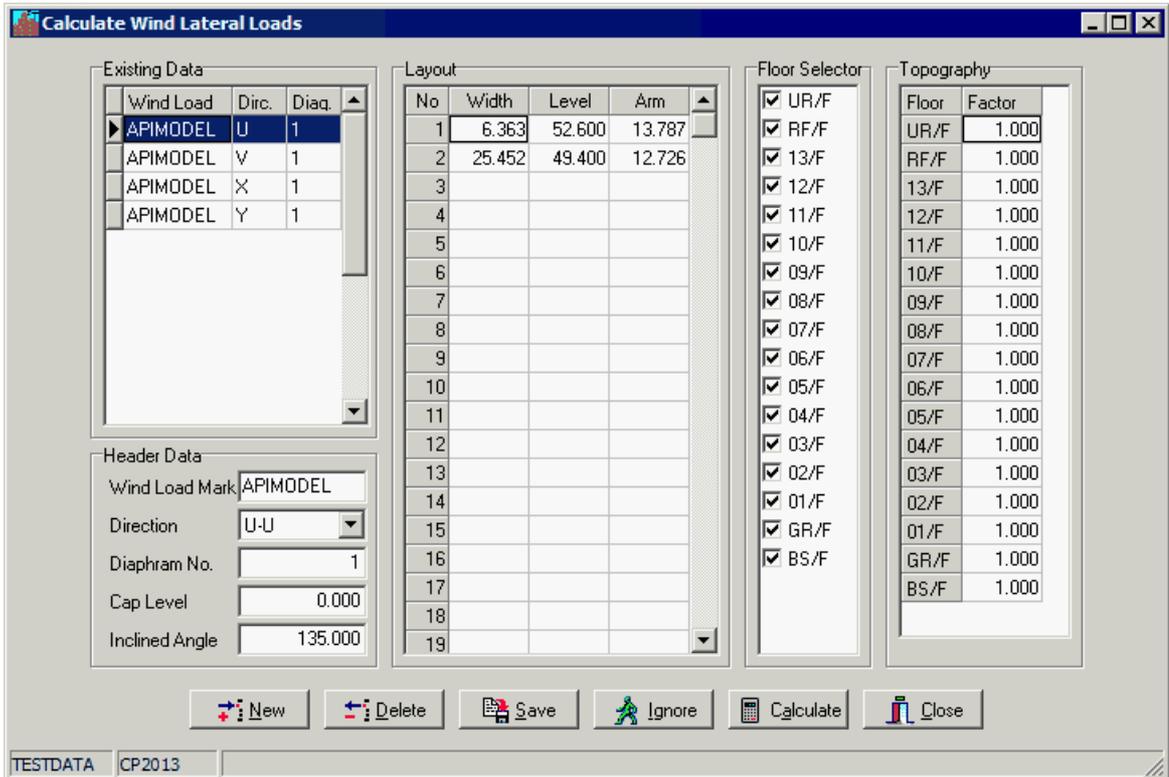
**Use** - You may adjust the calculated dynamic magnification factor manually in the edit box. **SADS** will use the adjusted dynamic magnification factor to calculate the wind load in [Wind Load Sub-command](#).

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 13.3 Wind Load Sub-command

The Wind Load sub-command is used to calculate the lateral load of whole building, frame, shear wall and core wall at the corresponding floor. **SADS** also provides the calculation result for the submission to B.D..

When you choose Wind Load from Miscellaneous Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Wind Load as below.



Wind Load	Dir.	Diag.
APIMODEL	U	1
APIMODEL	V	1
APIMODEL	X	1
APIMODEL	Y	1

No	Width	Level	Arm
1	6.363	52.600	13.787
2	25.452	49.400	12.726
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			

Floor	Factor
UR/F	1.000
RF/F	1.000
13/F	1.000
12/F	1.000
11/F	1.000
10/F	1.000
09/F	1.000
08/F	1.000
07/F	1.000
06/F	1.000
05/F	1.000
04/F	1.000
03/F	1.000
02/F	1.000
01/F	1.000
GR/F	1.000
BS/F	1.000

Header Data:  
 Wind Load Mark: APIMODEL  
 Direction: U-U  
 Diaphragm No.: 1  
 Cap Level: 0.000  
 Inclined Angle: 135.000

Buttons: New, Delete, Save, Ignore, Calculate, Close

Status Bar: TESTDATA CP2013

**Existing Data Group Box :** This group box is the listing of the existing wind load marks which have previously created.

#### Header Data Group Box :

**Wind Load Mark** - Enter up to 10 alphanumeric characters long for the wind load mark, this mark must be same as model name of Online Linking data which to be applied the lateral loads.

**Direction** - Click the combo box and select the direction of wind load.

**Diaphragm no.** - Enter "1" if you use the built in three dimension analysis. If you use ETABS, enter the diaphragm number of ETABS.

**Cap Level** - If you enter "0" to the field, the value of cap level is the level of the lowest floor minus 1.5 meter. You may according the actual situation enter the actual value of cap level.

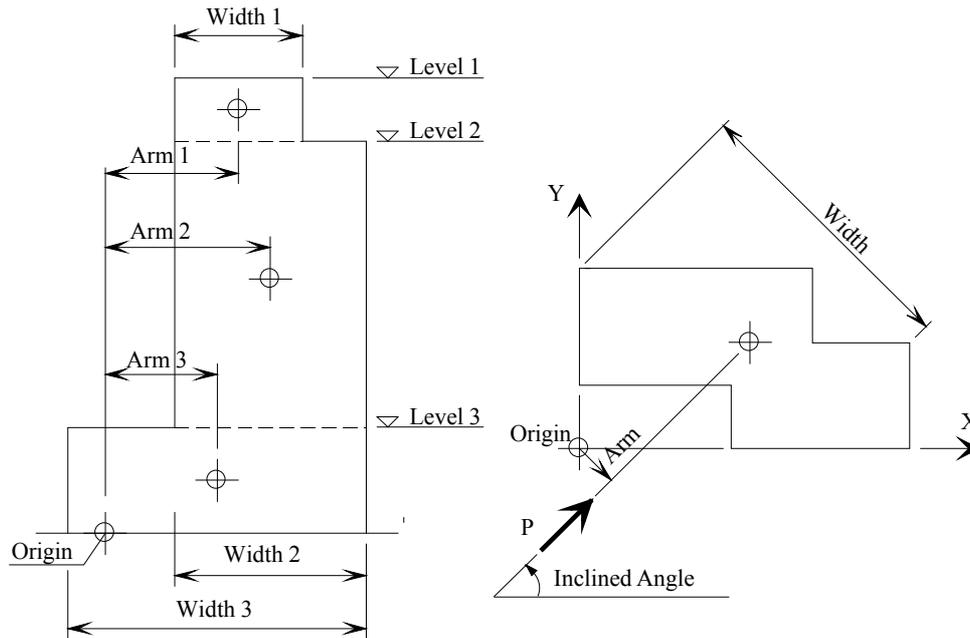
**Inclined Angle** - Enter the angle from global X axis to the wind direction.

**Layout Group Box :** The information of this group box is a groups of values about bay width, top level and lever arm at the different portions of wind pressure area. The diagram below this section shows you graphically about bay width, top level and wind load center.

**Width** - Enter the value (in M) of the bay width.

**Top Level** - Enter the value (in M) of the top level of different portions of wind pressure.

**Arm** - Enter the lever arm of wind load about the origin of global coordinate, unit: degree. If the load P is Anti-clockwise about origin of global coordinate, the lever arm is positive, otherwise the lever arm is negative.



**Floor Selector Group Box :** Check the check box of the floor code if you want to take lateral loads on that floor.

**Topography :** Where the topography is considered significant and you consider the dynamic effects, you need to calculate topography factor at the level of each floor and enter to the grid box.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

### 13.4 Water Tank and Screen Wall Sub-command

The Water Tank & Screen Wall sub-command allows you to calculate the thickness and the reinforcement bars of tank and screen walls.

When you choose Water Tank and Screen Wall from Miscellaneous Command or click 

button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), SADS will display the Water Tank & Screen Wall as below.

**Existing Data Group Box :** The list box is the listing of the existing tanks marks and screen walls marks.

**Input Data Group Box :**

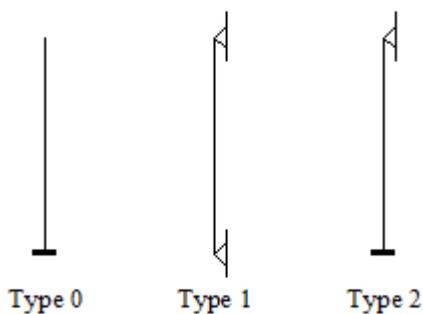
**Description** - Enter the particular description of the specific three dimension data which up to 30 characters long for your reference.

**Thickness** - Enter the thickness of wall. Unit : mm.

**Wall Span** - Enter the span of tank wall or screen wall. Unit : M.

**Cover** - Enter the concrete cover of reinforcement bars, unit: mm.

**Support Type** - SADS defined the support types into three different kinds, Click the Combo box and select the corresponding number of the support type. The followed figure shows you graphically about the support type.



0 -- Cantilever wall.

1 -- The wall which has hinged support at both ends.

2 -- The wall which has one hinged support and one fixed support.

**Direction** - Click the vertical radio button if the direction of selected wall span is in vertical, the horizontal radio button if it is horizontal.

**Load Type** - Click the radio button to select the load type is water pressure or water and soil pressure.

**Soil Depth** - If the load type is "water and soil", Click the edit box and enter the depth of soil. Unit: M.

**Surcharge** - If the load type is "water and soil", enter the value of surcharge which situated on ground. Unit : kN/M<sub>2</sub>.

**Concrete** - Click the combo box and select the grade number of concrete you wish.

**Exposure Class** - Click the combo box and select the exposure class of wall, "A", "B" and "C" are available.

**Tension** - Enter the value of tension force which applied to the wall. Unit : kN.

**Water Head** - Enter the value of water head. Unit : M.

**K2** - Enter the coefficient of retained soil pressure.

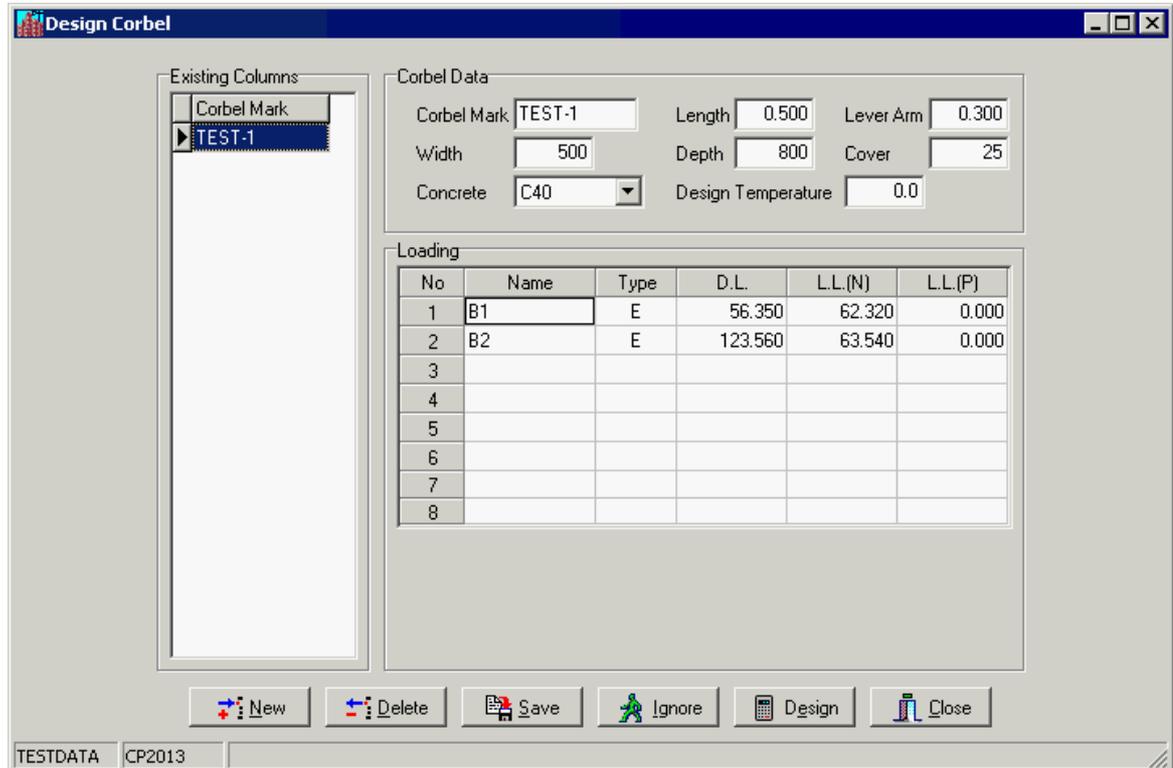
**Steel Bar** - Click the combo box and select the main bar is high tensile steel or enter mild steel.

You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 13.5 Corbel Design Sub-command

The Design of Corbel sub-command enables you to create, edit, check out corbel data and calculate the corbel data, **SADS** offers the calculation report for the submission to B.D..

When you choose Corbel Design from Miscellaneous Command or click  button on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Design of Corbel as below.



No	Name	Type	D.L.	L.L.(N)	L.L.(P)
1	B1	E	56.350	62.320	0.000
2	B2	E	123.560	63.540	0.000
3					
4					
5					
6					
7					
8					

**Existing Data Group Box** : The list box is the listing of the existing Corbel mark.

You may search the desired Corbel mark using [incremental search](#) described in How to use **SADS** topic.

**Input Data Group Box** :

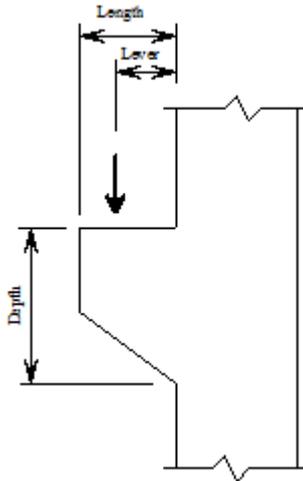
**Corbel Mark** - Enter up to 8 alphanumeric characters long for the corbel mark.

**Length** - Enter the length of corbel. Unit: M. Followed figure shows you graphically about the dimension of corbel.

**Lever Arm** - Enter the distance from the face of support to the nearest edge of load. Unit: M.

**Width** - Enter the width of corbel section. Unit: mm.

**Depth** - Enter the depth of corbel section. Unit: mm.



**Cover** - Enter the concrete cover of reinforced bars. Unit: mm.

**Concrete** - Click the combo box and select the grade number of concrete.

**Design Temperature** - Enter the design temperature for FLS checking.

#### Loading Group Box :

**Name** - Enter the name of load. If it is slab or beam, the load name must be exactly same as the slab mark or beam mark which previously defined in corresponding module.

**Type** - Click the combo box and select the type of load. **SADS** provide following symbols for loading type.

"L" -- Indicate the load is the left edge of beam, **SADS** will extract the reaction value automatically.

"R" -- Indicate the load is the right edge of beam, **SADS** will extract the reaction value automatically.

"E" -- Indicates the load is not beam, you must input the value of dead load or live load manually.

**D.L.** - if type is "E", enter the value of dead load. Unit: kN).

**L.L.(N)** - if type is "E", enter the value of non-permanent live load. Unit: kN.

**L.L.(P)** - if type is "E", enter the value of permanent live load. Unit: kN.

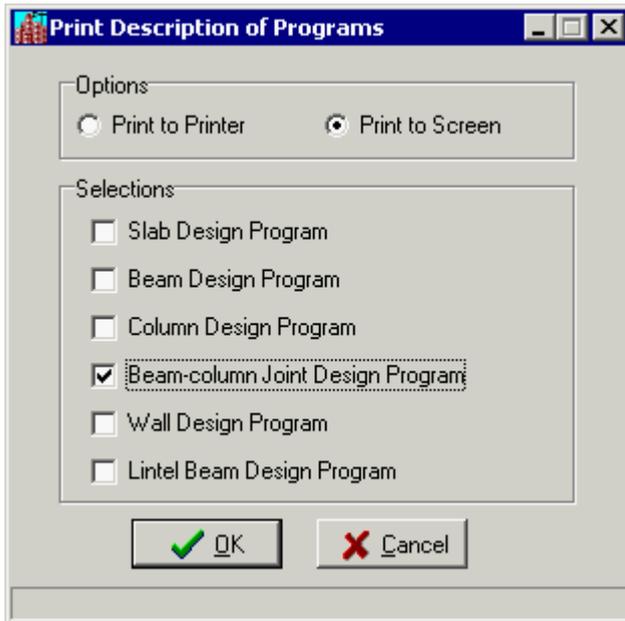
You may use the [common buttons](#) at the lower part of the window to manipulate the data processing.

## 13.6 Print Description Sub-command

The Print Description sub-command enables you to print out the calculation formula and types of slabs, beams, walls, etc., which attach to the corresponding calculation report submit to B.D..

When you choose Print Program Description from Miscellaneous Command or click  button

on [Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Print Description as below.



**Print Options Group Box :** Click the radio button of "Print to Printer", if you want to print out the selected program to the printer. Click the radio button of "Print to File", if you want to print to the temporary file and automatically display on screen.

**Selections Group Box :** Check the check box of the desired program in this group box and click "OK" button to print out the calculation formula and type. The selection of the programs are:

1. Description of Slab Design Program.
2. Description of Beam Design Program.
3. Description of Column Design Program.
4. Description of Beam-column Joint Program.
5. Description of Wall Design Program.
6. Description of Lintel Beam Design Program.

The contents of these descriptions are stored in following ASCII files in System Folder:

SLAB.TXT, SLABFLS.TXT -- the description of slab design;  
 BEAM.TXT, BEAMFLS.TXT -- the description of beam design;  
 COLUMN.TXT, COLUMNFLS.TXT -- the description of column design;  
 JOINTS.TXT, JOINTFLS.TXT -- the description of beam-column joint design;  
 WALL.TXT, WALLFLS.TXT -- the description of wall design;  
 LINTEL.TXT, LINTELFLS.TXT -- the description of lintel beam design.

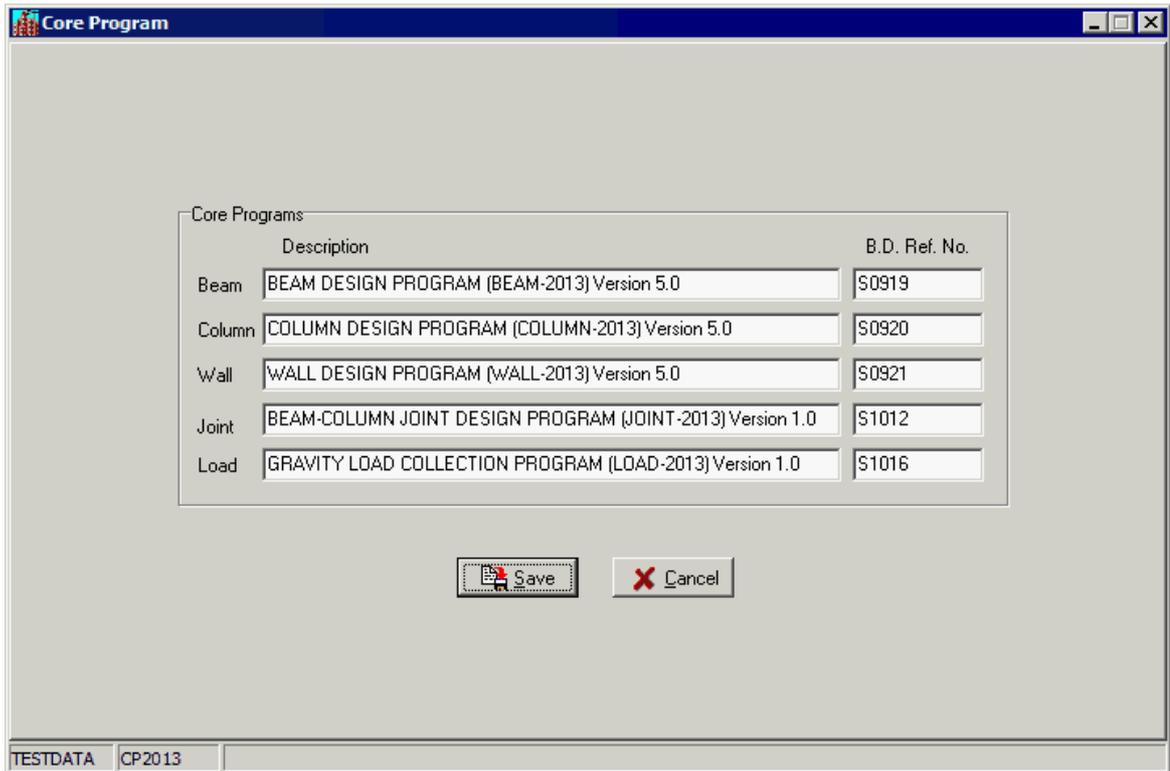
If you want to change some contents of these files, you may use any text editor to make the changes you wish. Except the design data that you input in Master Data sub-command for the calculation.

## 13.7 Core Programs Sub-command

The Core Programs sub-command allows you to maintenance the information of these programs. You may change the descriptions and B.D. reference numbers if it is necessary.

When you choose Core Programs from Miscellaneous Command or click  button on

[Command Button Bar](#) then click  button on [Sub-command Button Bar](#), **SADS** will display the Core Programs as below.



After you make some changes, you should click "Save" button. If you click the "Cancel" button, **SADS** will ignore these changes and close the window.

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