

SAP Guide

(>File means click on the tab titled "File")

I) Starting out

(>File > New Model)

- 1) Pick correct units in the start-up window at the lower right corner of screen, particularly feet or inches (K,in,F is kips, inches, Fahrenheit)
- 2) decide whether you want a grid in the background or a blank screen: >Blank or >Grid only if you select a grid ... Define the:
 - number of grid lines
 - spacing (the number you enter is the distance between lines in the units you selected)
- 4) Always work in the **XZ plane** when modeling a 2-dimensional structure
 - the xz plane view can be selected by >xz
 - Z is the direction of gravity in SAP

II) Materials and sections

- 1) >Define >Materials, pick or define material type, 4000psi=concrete, A99sFy50=steel (you can edit material properties to be used in various sections, such as unit weight and modulus of elasticity).
- 2) >Define >Section Properties >Frame >Import a standard steel section (AISCLRF1) or define your own section with >Add New Property (You can define the materials and cross-sectional properties of frame members, and also use general property multipliers.)

III) Drawing in members

- 1) Select "Draw Frame Element" from left side toolbar
- 2) click at any point on screen to create first end of the member, click on another point to define another end of the member and continues with additional clicks for more members, or double click to indicate that you are done entering members, then click on the arrow at left toolbar to stop placing members,

IV) Entering Supports:

- A) Select any joint where a support should be by clicking on it,
- B) >Assign > Joint > Restraint > and then add check marks for the restraints you wish, the 1,2, & 3 directions coincide with X, Y, &Z axes

V) Hinges:

By default SAP assumes that any members that adjoin each other are connected with moment transferring connections, if you wish the joint hinged then:

- A) Select either member adjoining the hinge location by clicking on it,
- B) >Assign >Frame > Release >3-3 Moment
 - a) Specify whether to release the moment at the start or end of the member you selected. This will depend on the direction you initially drew the member.

VI) Loading:

First define the type of loading case you are creating by >Define >Load Pattern, a DEAD case is automatically included and if "Self Weight Multiplier" is "1" then the program automatically calcs and adds the self weight dead load to all elements. If you wish to define your own values set the multiplier equal to zero. You may want to create a LIVE load pattern = type in the name you wish to

call it where DEAD appears, select the “Type”. If LIVE is selected as the TYPE then usually the self weight multiplier automatically becomes zero and self weight is not included in this pattern. Then:

- A) Select the joint or frame element where you want to apply a point load or continuous load
- B) >Assign >Joint or Frame Load > Forces (for Joints)/ Point or Distributed (for Frames)
- C) Select which direction you want the load to act in. Positive or negative signs matter for this input.
- D) Keep track of whether you are “adding to” or “replacing” loads on that specific member/joint.

VII) Display

- A) To see at any time what loads you have all applied:
>Display >Show Load Assignments > Frame or Joint

VIII) Analyzing

- 1) >Analyze >Set Analysis Options > “XZ Plane”
- 2) >Analyze > Run Analysis >... then Select “Modal” > **Do Not Run**
After this, select “Dead” and then run this case

IX) Output

- 1) For Shear/Moment/Axial Diagrams:
 - >Display >Show Forces > Frames
 - >Moment 3-3 or
 - > Shear 2-2 or
 - > Axial

 - > “Show values on Diagram”

 - >Options > uncheck “Moments on Tension side”
- 2) For better printing change to a white background:
 - >View >Set Display options > White background/Black objects
- 3) Printing Diagrams:
 - >File >Capture Picture >User region
 - The program will then save this picture. You can copy and paste it in a word file to organize everything.

You can also PrintScr or use the Snipping Tool.
- 4) Joint Displacements/Reactions:
 - > File >Print Tables >Analysis results >Joint output > Select both “Displacements” and “Reactions”
 - Make sure that “Print to File” is selected