# Example Problem No. 6

This is an example of prestress loading in a plane frame structure. It covers two situations: 1) From the member on which it is applied, the prestressing effect is transmitted to the rest of the structure through the connecting members (known in the program as PRESTRESS load). 2) The prestressing effect is experienced by the member(s) alone and not transmitted to the rest of the structure (known in the program as POSTSTRESS load).
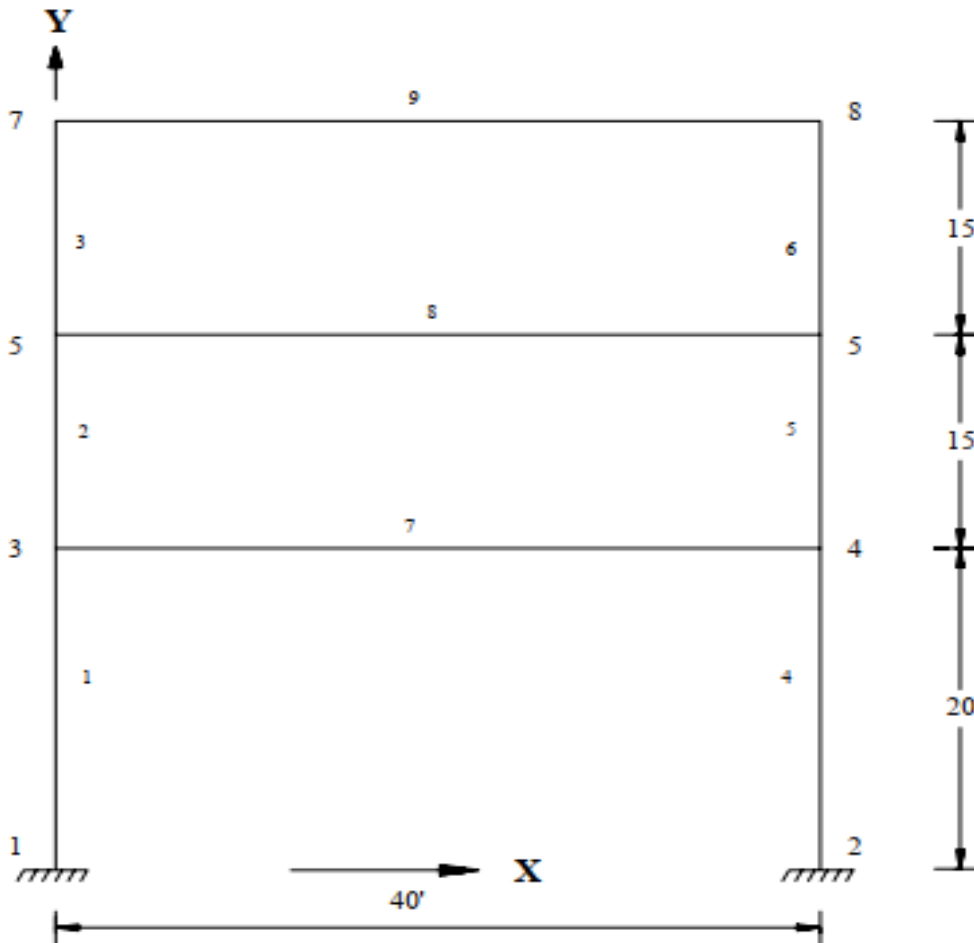
Actual input is shown in bold lettering followed by explanation.

STAAD PLANE FRAME WITH PRESTRESSING LOAD

Every input has to start with the word STAAD. The word PLANE signifies that the structure is a plane frame structure and the geometry is defined through X and Y axes.

UNIT KIP FT

Specifies the unit to be used for input to follow.

JOINT COORD
1 0. 0. ; 2 40. 0. ; 3 0. 20. ; 4 40. 20.
5 0. 35. ; 6 40. 35. ; 7 0. 50. ; 8 40. 50.

Joint number followed by X and Y coordinates are provided above. Since this is a plane structure, the Z coordinates need not be provided. Semicolon signs (;) are used as line separators, and that allows us to provide multiple sets of data on one line.

MEMBER INCIDENCE
1 1 3 ; 2 3 5 ; 3 5 7 ; 4 2 4 ; 5 4 6
6 6 8 ; 7 3 4 ; 8 5 6 ; 9 7 8

Defines the members by the joints they are connected to.

SUPPORT
1 2 FIXED

The supports at joints 1 and 2 are defined to be fixed supports.

MEMB PROP
1 TO 9 PRI AX 2.2 IZ 1.0

Member properties are provided using the PRI (prismatic) attribute. Values of area (AX) and moment of inertia about the major axis (IZ) are provided.

UNIT INCH
CONSTANT
E 3000. ALL ; POISSON CONCRETE ALL

The CONSTANT command initiates input for material constants like E (modulus of elasticity), Poisson's ratio, etc. Length unit is changed from FT to INCH to facilitate the input.

LOADING 1 PRESTRESSING LOAD
MEMBER PRESTRESS
7 8 FORCE 300. ES 3. EM -12. EE 3.

Load case 1 is initiated along with an accompanying title. Load 1 contains PRESTRESS load. Members 7 and 8 have a cable force of 300 kips. The location of the cable at the start (ES) and end (EE) is 3 inches above the center of gravity while at the middle (EM) it is 12 inches below the c.g. The assumptions and facts associated with this type of loading are explained in section 1 of the Technical Reference Manual.

LOADING 2 POSTSTRESSING LOAD
MEMBER POSTSTRESS
7 8 FORCE 300. ES 3. EM -12. EE 3.

Load case 2 is initiated along with an accompanying title. Load 2 is a POSTSTRESS load. Members 7 and 8 have cable force of 300 kips. The location of the cable is the same as in load case 1. For a difference between PRESTRESS loading and POSTSTRESS loading, as well as additional information about both types of loads, please refer to section 1 of the Technical Reference Manual.

PERFORM ANALYSIS

This command instructs the program to perform the analysis.

UNIT FT
PRINT ANALYSIS RESULT

The above command is an instruction to write joint displacements, support reactions and member forces in the output file. The preceding line causes the results to be written in the length unit of feet.

FINISH

This command terminates the STAAD run.