3D Frame Analysis using SAP2000

- D.L = 20 lb/ft, L.L = 60lb/ft,
- Fy = 60 ksi, fc' = 4ksi
- B1 = 18” x 12”,
- C1 = 12” x 12”.

Steps:

- Unit = Kft-F

- New model= grid,
    - x = 4,
    - y = 1,
    - z = 4
    - Edit
        - x = 0, 20,35,40,
        - y = 0
        - Z = 0, 2,18, 23.

Draw > draw frame & draw the frame.

- Option Preferences
  - Concrete ACI-2003

- Define > material,
  - concrete,
  - Modify,
  - fy= fys=60ksi,
  - f'c= 4ksi.

- Define > frame sections.
  - Add rectangular sections,
  - Name= B1,
  - Depth= 18",
  - width =12",
  - Reinforcement, click beam button clear cover top=Bottom=2.5"

- Define > frame section.
  - Add rectangular section,
  - Name= C1,
  - Depth=12",
  - width =12",
  - Reinforcement, click column button, clear cover= 2.5, click design button.

- Define > load cases,
  - Add line load.

- Define > add default combo, check concrete.
  - Cover to uses check boxes.

- Select beams.

Assign > frame

- Frame sections,
- Select B1.
- Select columns.

- Assign > frame
  - Frame section,
  - Select C1

- Select Beams.

- Assign > frame load

- Distributed,
- Load case = dead,
- select= gravity projected direction.
- Wu = 0.02k/ft.

- Select > get previous select.

- Assign > frame load >
  - Distributed. Load case = live,
  - select gravity projected direction.
  - Wu = 0.06 K/ft.

- Select extreme left column.

- Assign > frame loads > point.
  - Direction = x,
  - select relative radio button.
  - X= 0.5,
  - Load= 10k.

- Select extreme left support.

- Assign > Joint
  - Restrained,
  - Select fixed support.

- Select middle support & select roller support.

- Select > Get Previous selection.

- Assign > Joint
  - Load case,
  - Y= -30.

- Analyze > Analysis case,
  - x-z plane.

- Analyze > Run analysis,
  - Select model.
  - Click “DO NOT RUN” button,
  - “RUN NOW , button.

- Display > deformed shape;
  - select UDCON2.

- Display > show forces/stress

- frame,
- select UDCON2

- Select F22,
  - Uncheck full,
  - Check show values.

- Display > show forces > stress
  - Frame,
  - Select M22 > Joints
  - Select UDCON2.

- Design > concrete frame design > select design combo.
  - Select UDCON1, UDCON2.

- Design > concrete frame design
  - Start design check.

- Design > concrete frame design
  - Verify all members posed.

- Design > concrete frame design> display design info.
- Select longitudinal reinforcement.

- For beams, select max, upper & lower value, and for column, select max. Value. Do calculation and find No. of Bars.