Concrete Parking Structure

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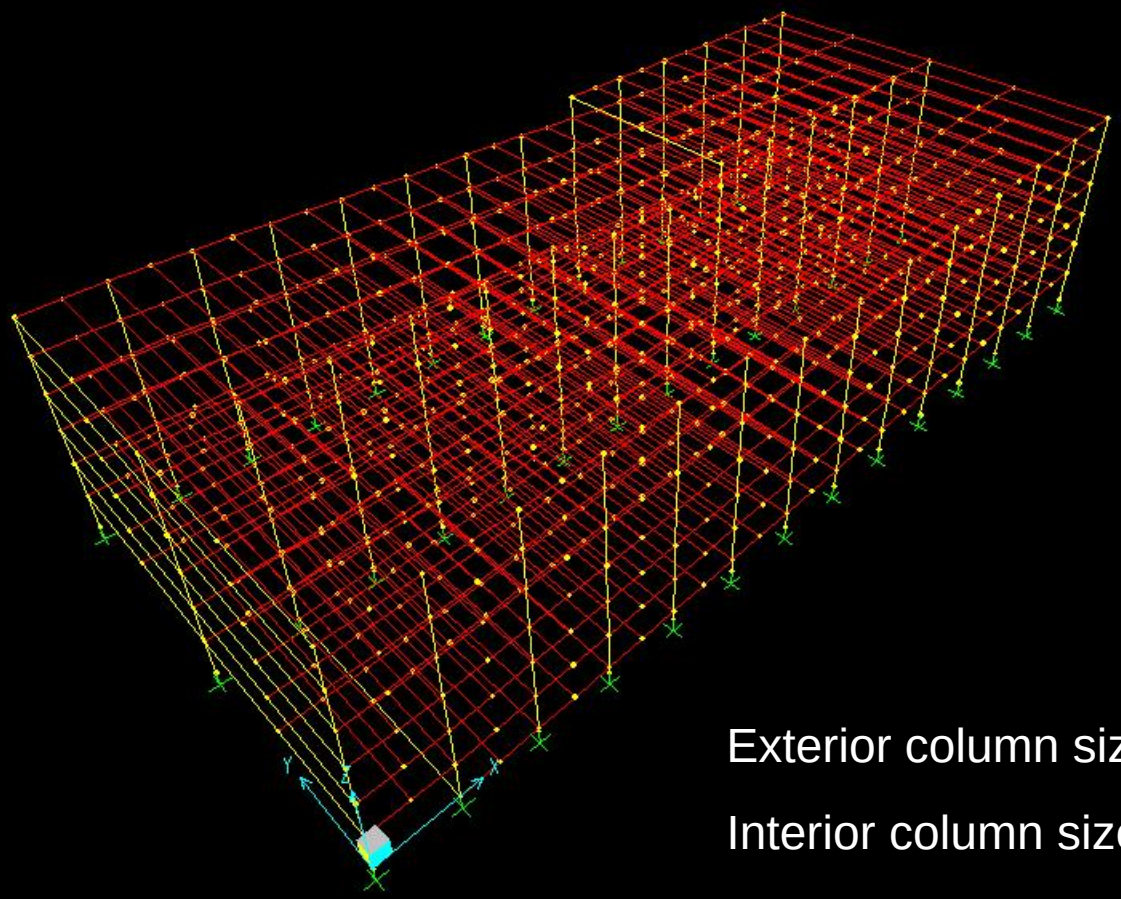
Project 2

CE 409

Design Requirements

- 6 story concrete structure
- Total Area = 224’ x 96’
- The number of Bays along long direction:14
  - Bay width: 16 ft
- The number of Bays along short direction: 2
  - Bay width: 48 ft
- Slab Thickness: 7 inch

Design of the Structure

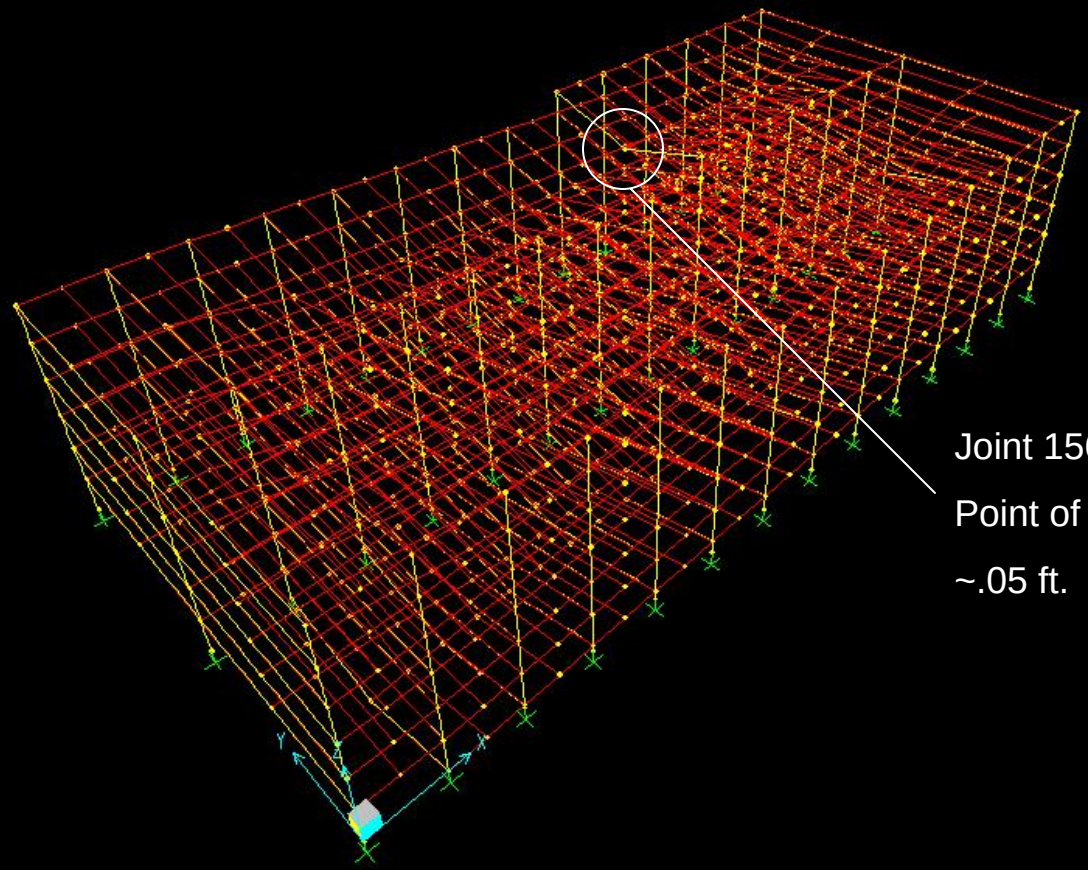


Exterior column size: 16” x 18”

Interior column size: 24” x 24”

Beam size: 16” x 30”

Loaded Structure

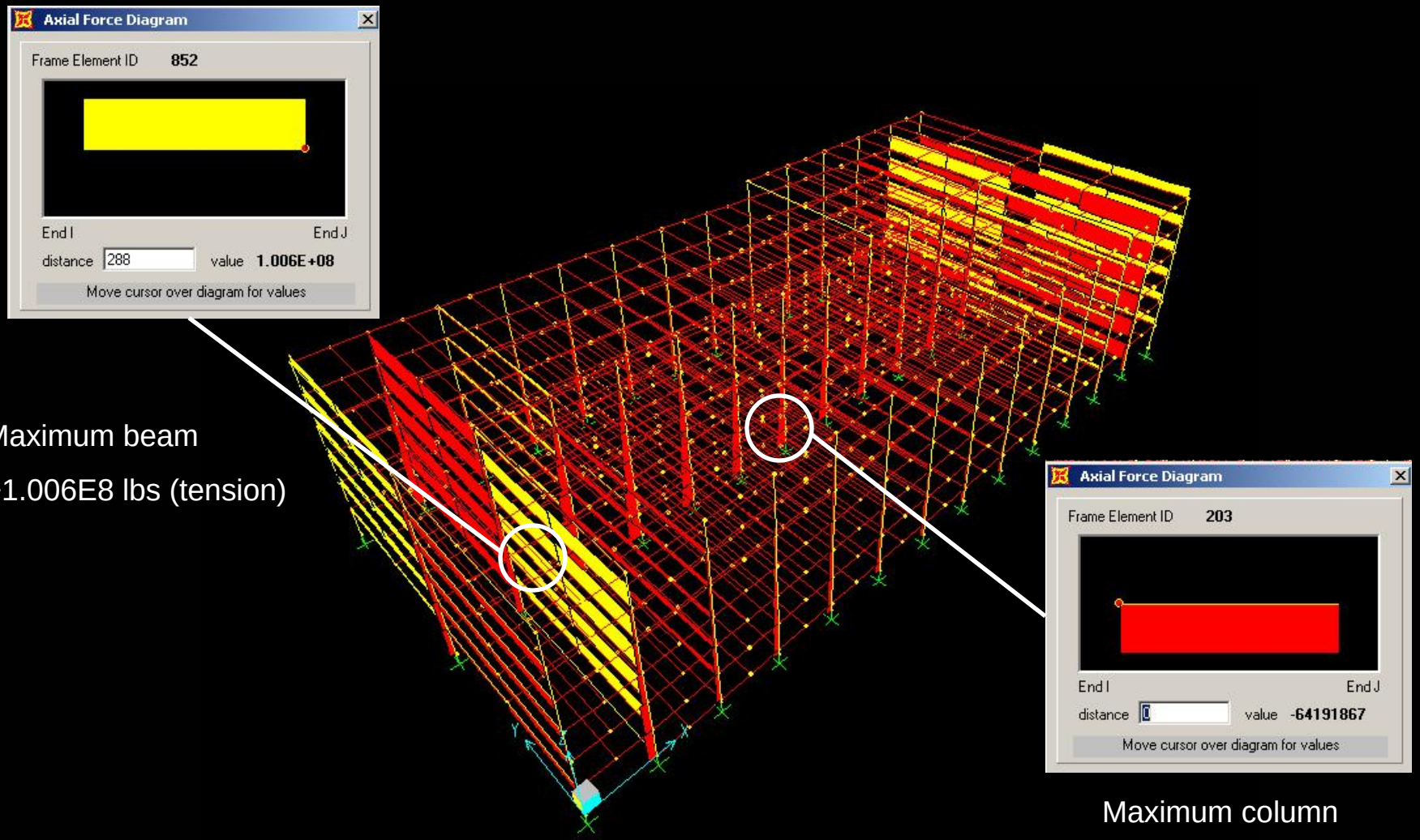


Joint 1563:

Point of Maximum deflection

~.05 ft.

Axial Force



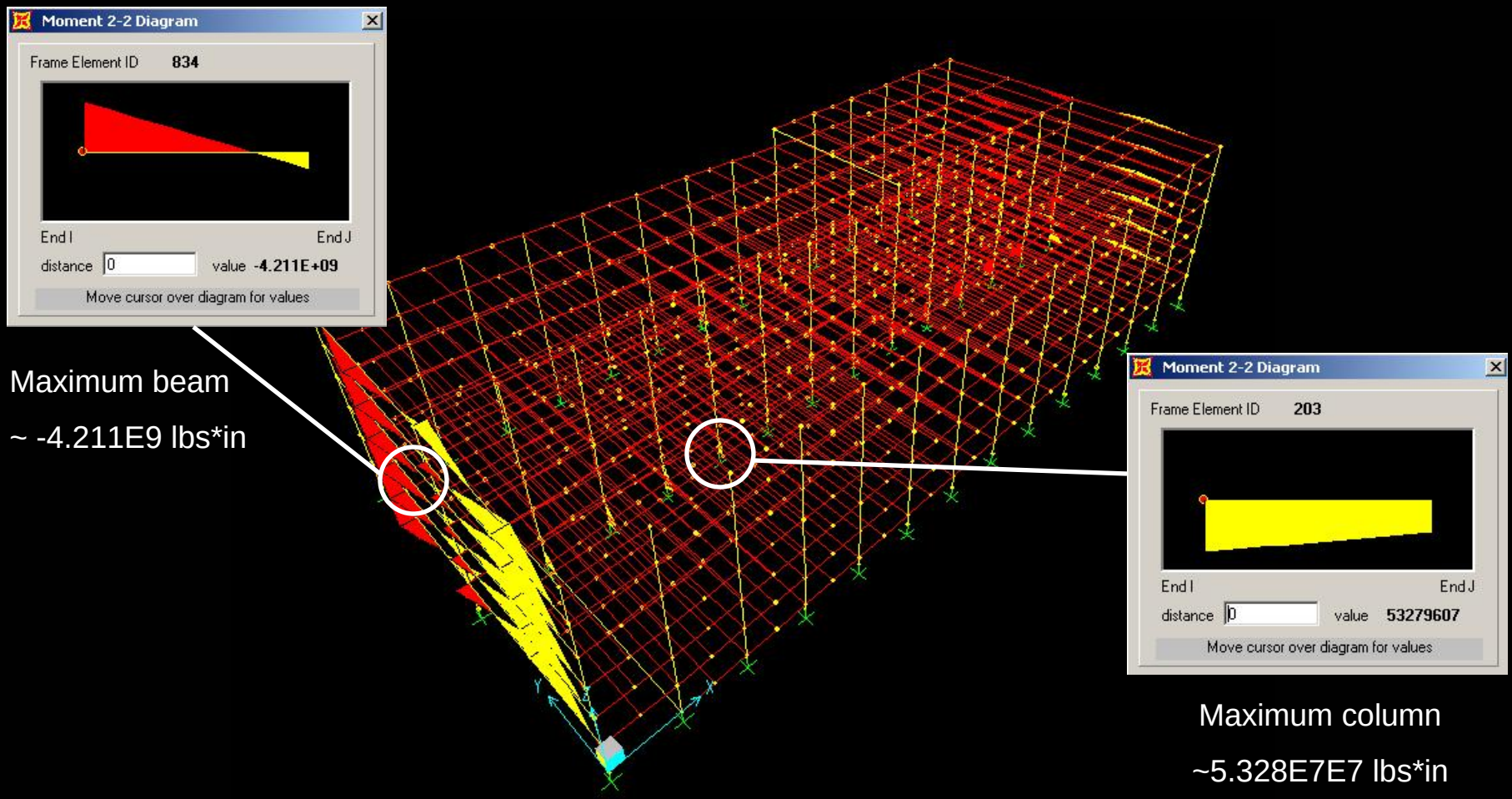
Maximum beam

~1.006E8 lbs (tension)

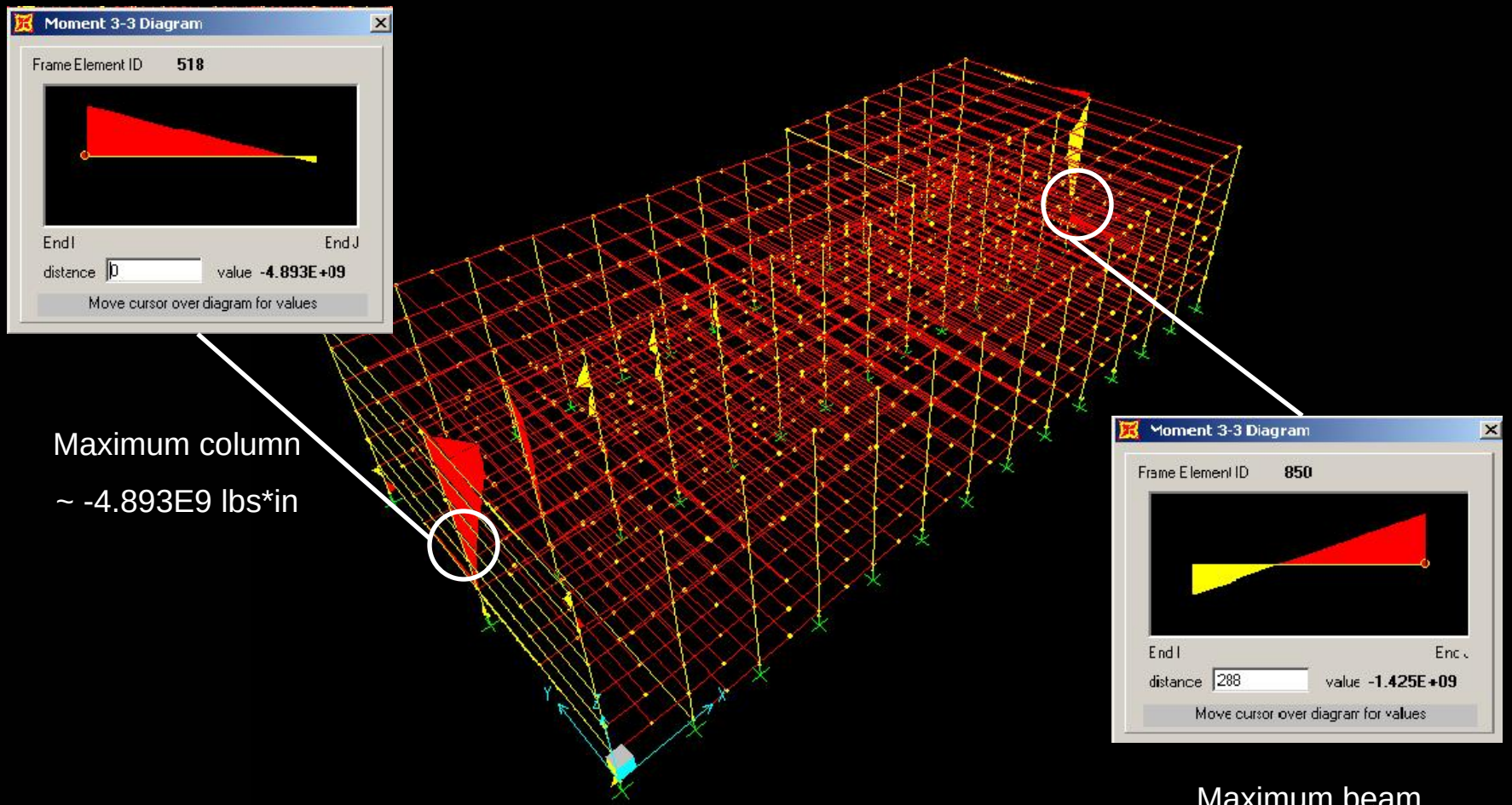
Maximum column

~ -6.419E7 lbs (compression)

Moment in Minor Axis



Moment in Major Axis



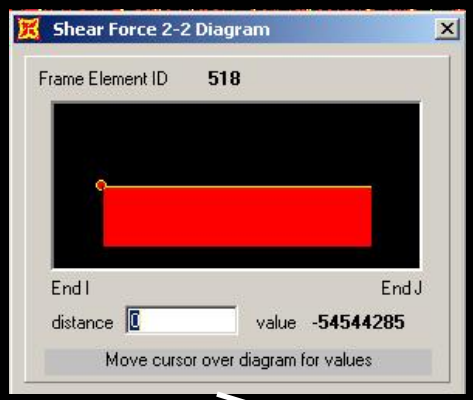
Maximum column

~ -4.893E9 lbs*in

Maximum beam

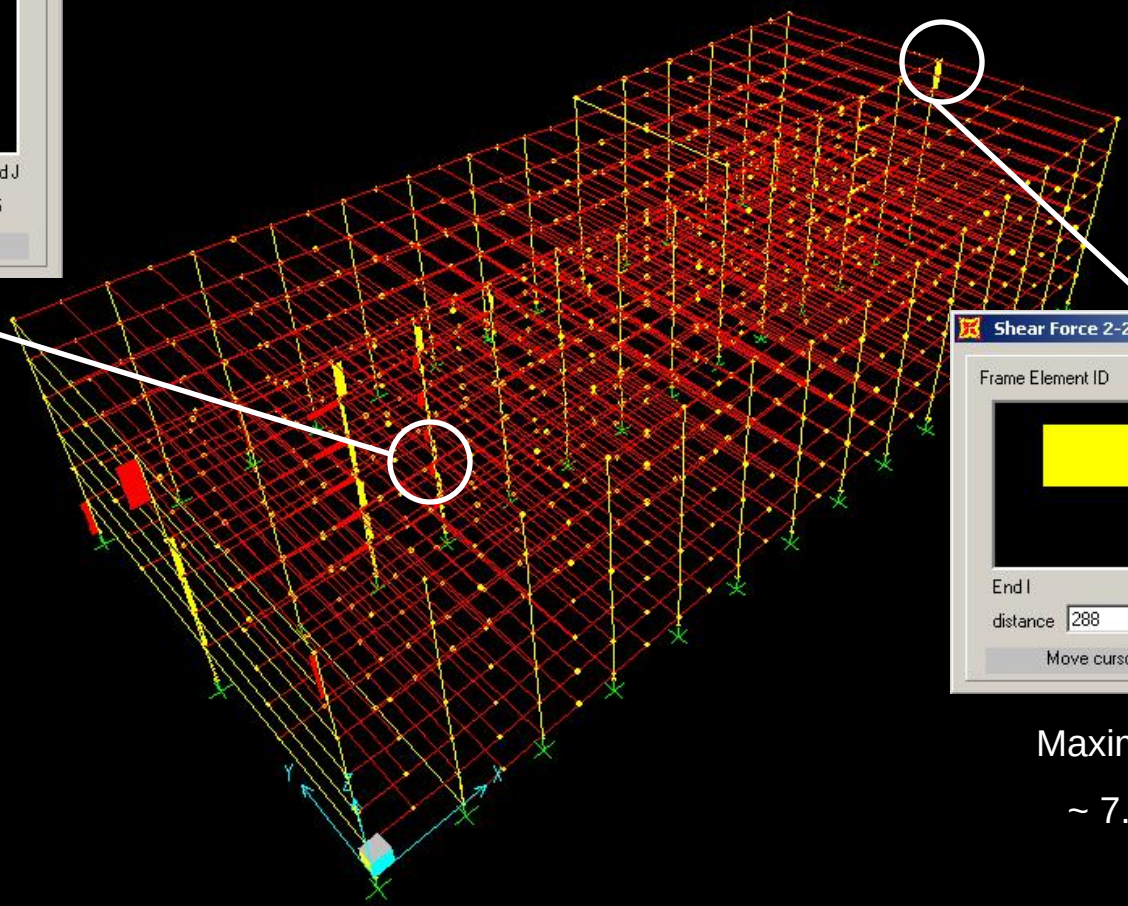
~ -1.425E9 lbs*in

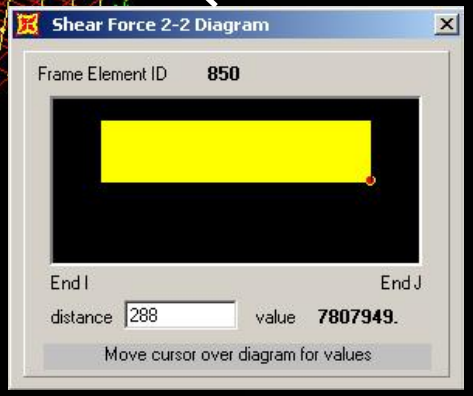
Shear in Minor Axis



Maximum beam

~ -5.454E7 lbs

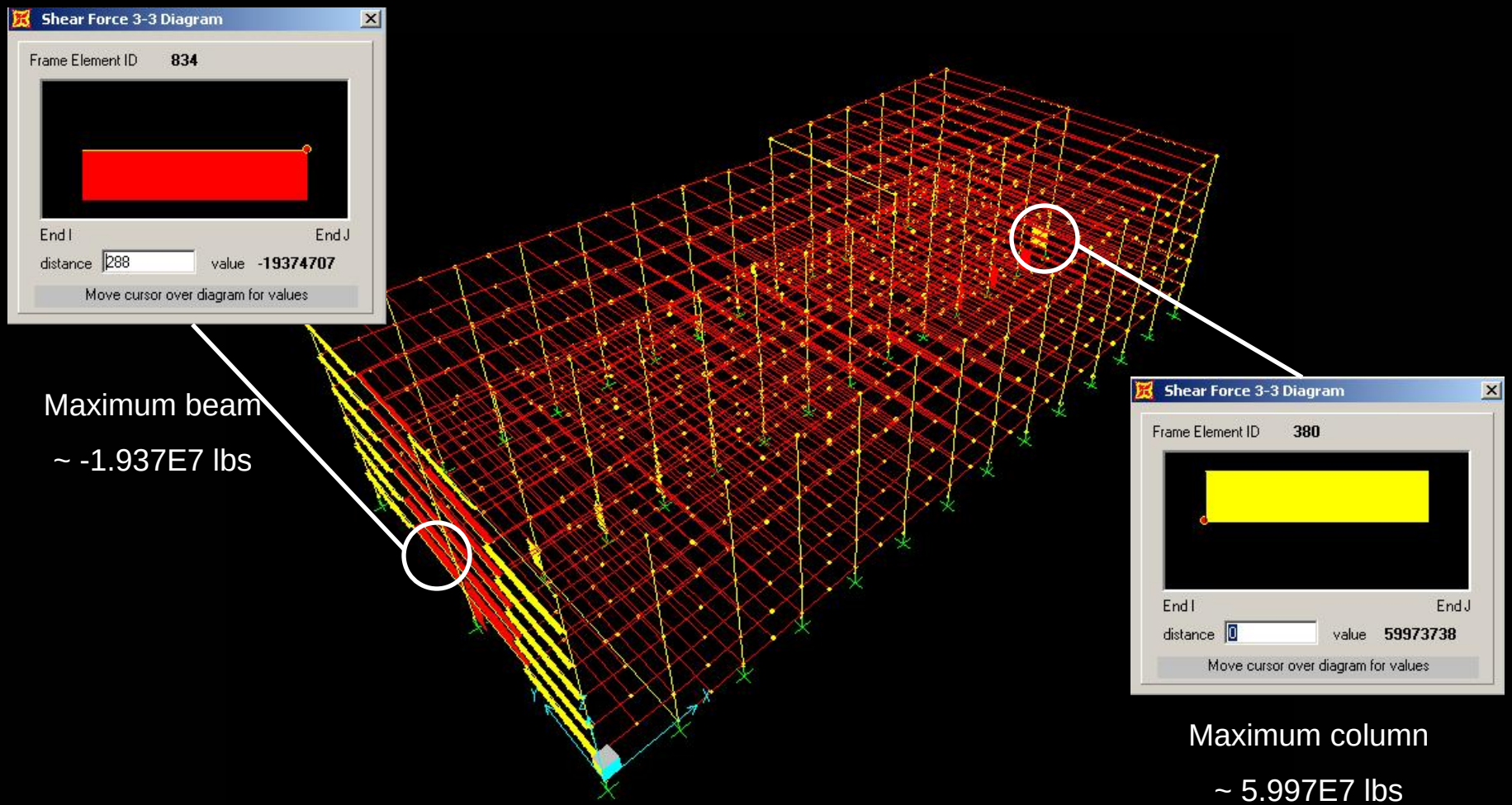




Maximum column

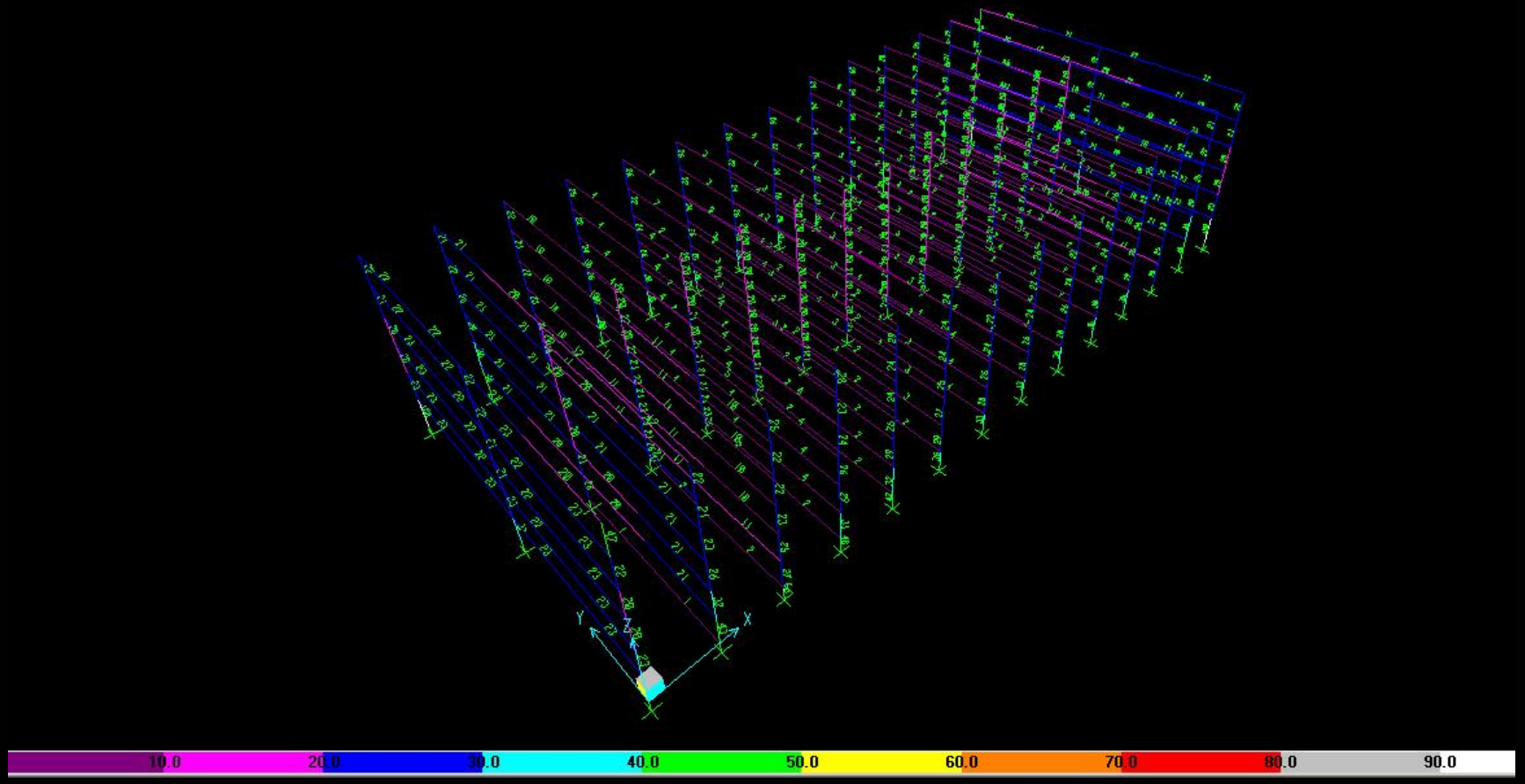
~ 7.808E6 lbs

Shear in Major Axis



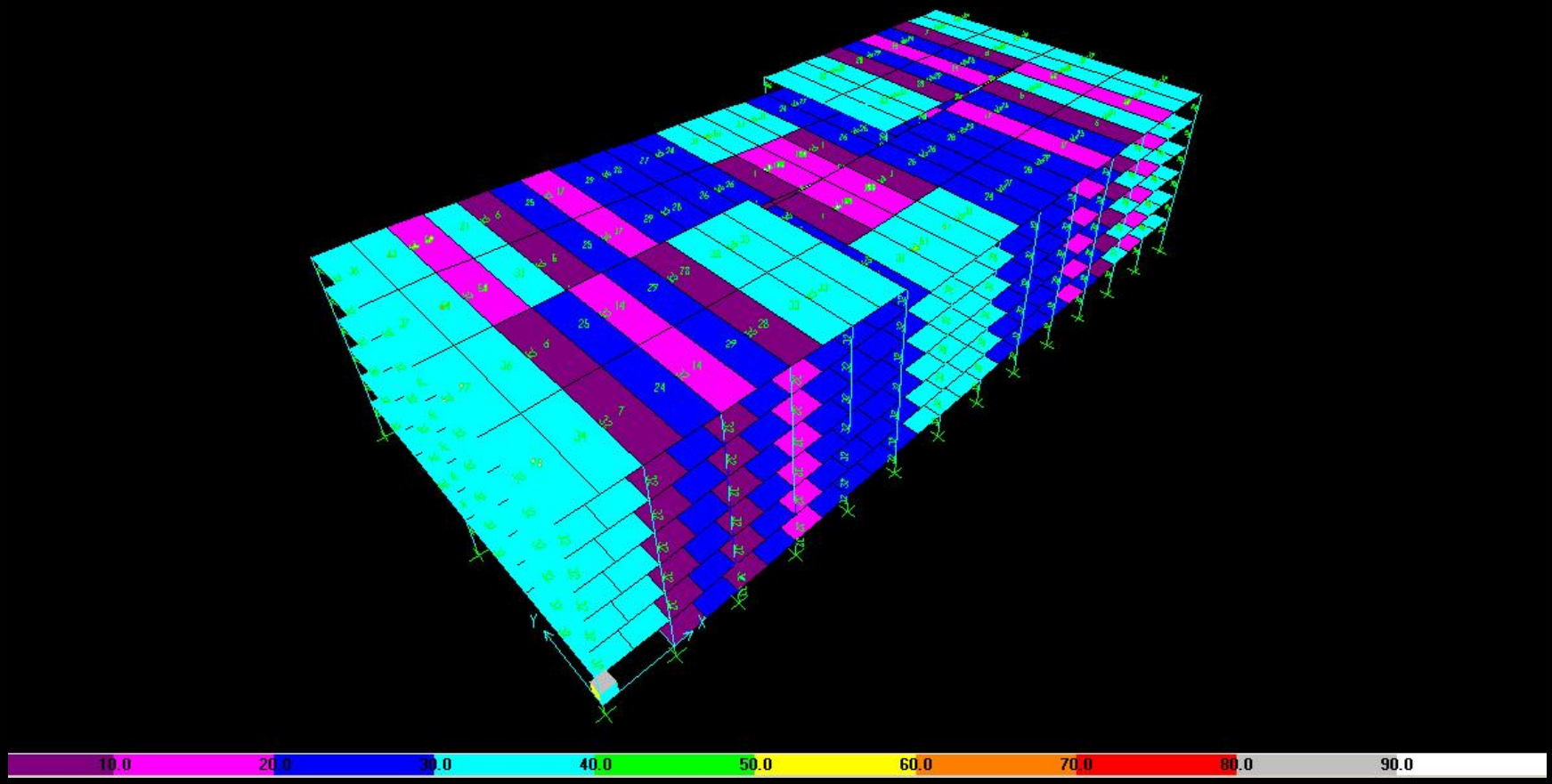
Safety of Design

Beams and Columns



Safety of Design

Slab



Conclusion

- Beams and Columns:
  - Since the analysis check resulted in a satisfactory energy diagram, i.e. values in the 10% - 30% and not overstressed, the design of the columns and beams can be concluded as safe.
- Slab:
  - The energy diagram resulted in satisfactory values of 20% - 40%, the design of the slab can be concluded safe as well.
- Since the 3 major elements of the structure have been proven to be safe, the structure as a whole can be concluded to be safe for use.