

# Rockville Metro Plaza II



John M. Vais | Structural Option

## Tech IV - Lateral System

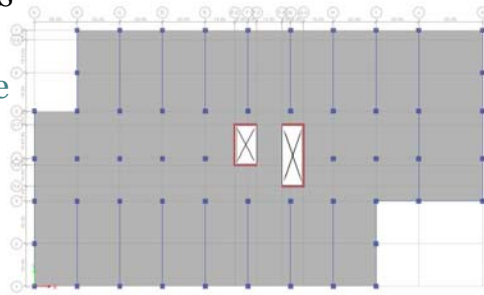
### Background Information



- Location -  
Rockville, MD
- Function -  
Office/Retail/Parking
- Size
  - 10 Stories Tall
  - 323,000 s.f. (gross)
- Developer -  
Foulger Pratt
- Structural Engineer -  
Cagley & Assoc.

## As-Built Lateral System

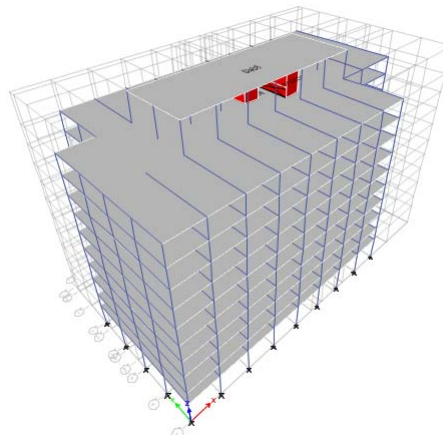
- Concrete Moment Frames
  - Cast in place
  - Columns, Beams, Floor Slabs
- Concrete Shear Walls
  - Cast in Place
  - Frame Elevator Core (three sides)



Etabs 2013– Floor Plan

## Analysis Approach

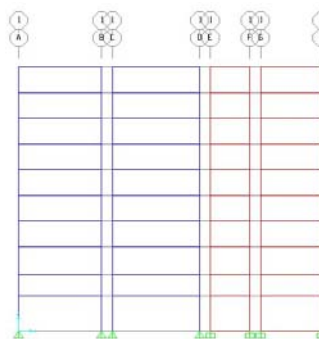
- 3-D Model
  - Etabs 2013
  - SAP 2000
- 2-D Model
  - SAP 2000
  - Excel



Etabs 2013– 3-d Model

## Modeling Assumptions

- Entire Structure Participation
  - Consider All Structural Elements
- Pinned Base Assumption
  - Shallow Footings
  - Seismic Base
- Rigid Diaphragm Assumption
  - Concrete Floor Slab  
(8 in. thick)



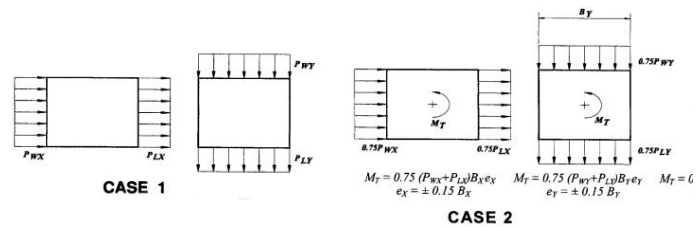
SAP2000 – 2-D Frames

## Special Consideration

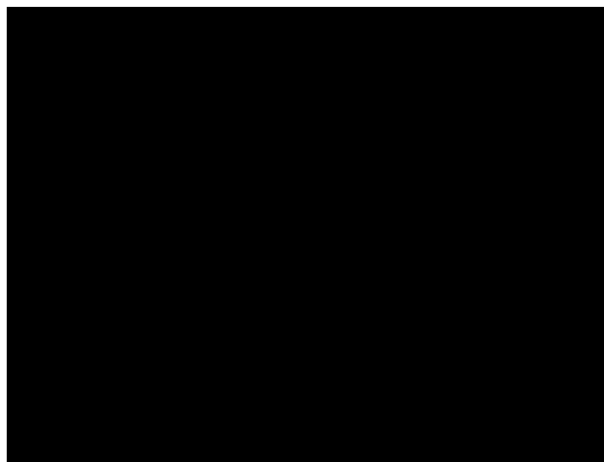
- Material Strength Gradation
  - Concrete Strength Reduces by Building Level
- Concrete Cracked Behavior
  - As Per ACI 318
- Squared Geometries
  - Simplify Curved Portions
- Varying Floor-to-Floor Heights
- Treat Adjacent Shear Walls as Not Joined

## Distribution of Forces

- Wind
  - Applied At Center of Pressure
  - Forces determined and distributed as Per ASCE 7
- Seismic
  - Applied At Center of Mass
  - Forces determined and distributed as Per ASCE 7

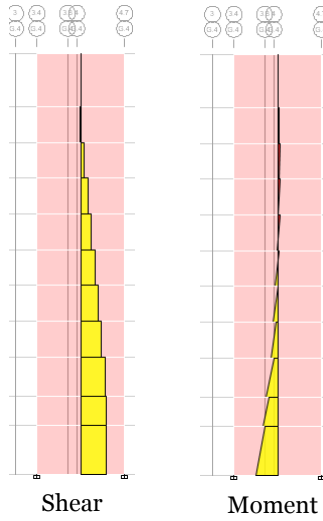
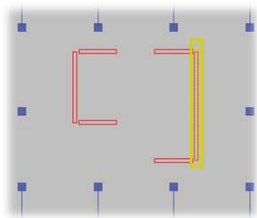


## Animation



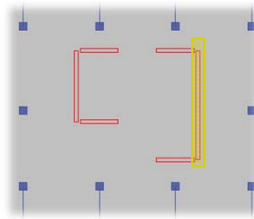
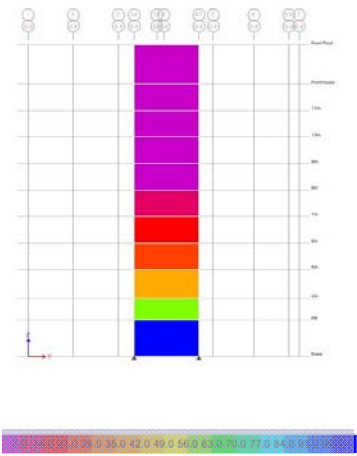
## Shear/Moment Diagrams

- 28' Long Shear Wall
- Wind Case 2 Controlled



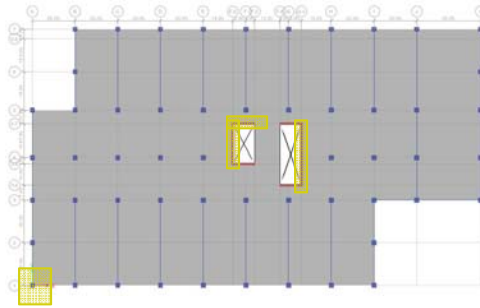
## Member Utilization Ratio

- 28' Long Shear Wall
- Wind Case 2 Controlled



## Spot Checks

- 2-D Analysis vs. 3-D Analysis
  - Flexibility/Stiffness
- Shear Walls
  - Strength/Reinforcing
- Columns
  - Strength
- Serviceability
  - Story Drifts



## Conclusion

- Lateral System is Sufficient for Loads Applied
  - Shear Walls Strength
  - Moment Frame Strength
  - Building Drift and Deflection

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