Steel vs. Concrete
Frames/Shear wall Structure

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100% Cast in place Reinforced Concrete Structure

There must be some reason WHY?

Client interested in:

Controled Investment
To Limit the Budget
Opening Date
Low Maintains Expenses
Profit

Architect's advice/vision

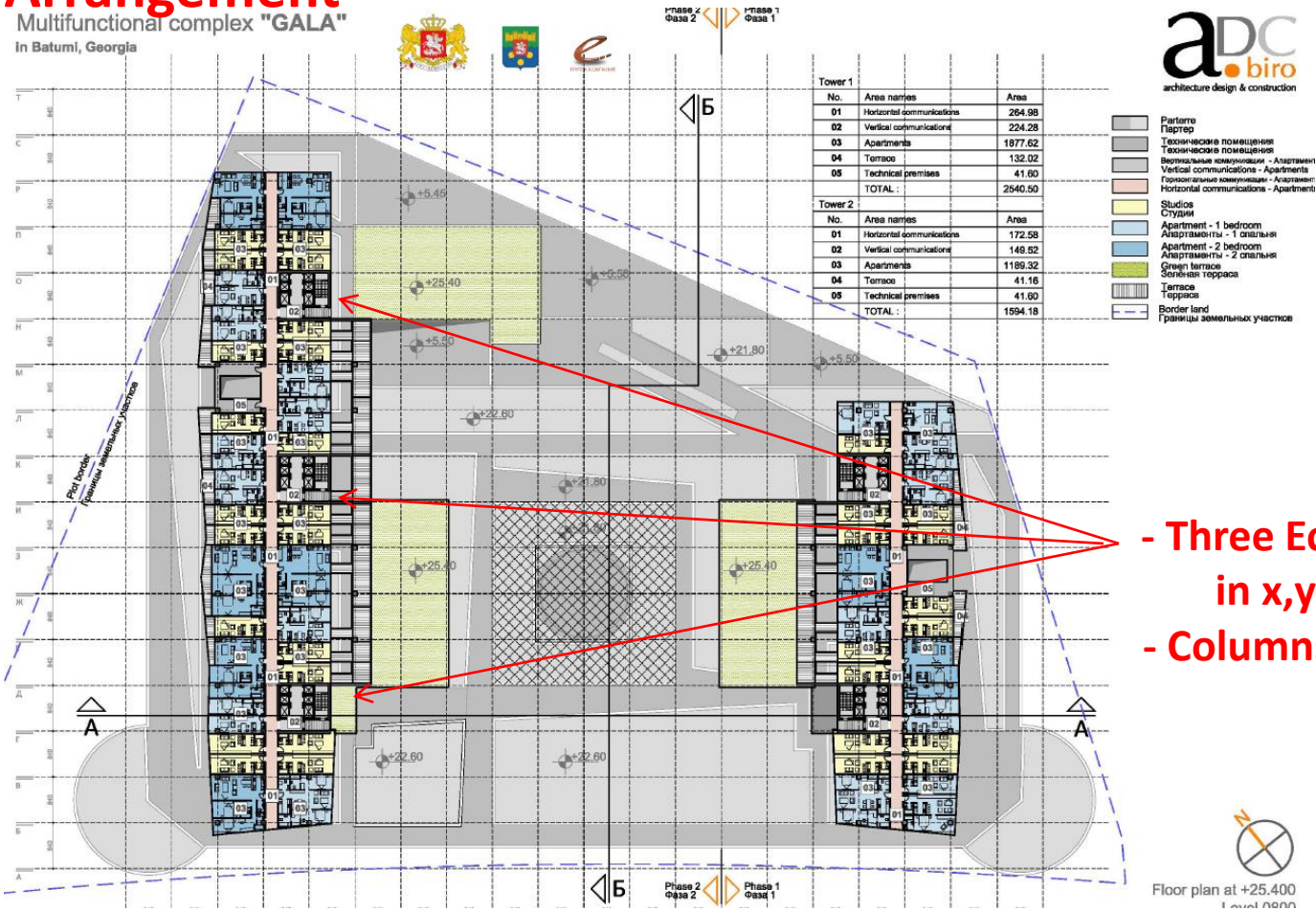
Engineer's advice/interpretation/plan execution/

Design on Budget
Environmental Impacts
Availability of Materials, Local workmanship practice…
Speed of Construction
Robustness, safety
Durability
Maintains Expenses
Energy - 'Green Issues'
…

Optimal Design

‘Gala’ Complex – Client/Architect Intent

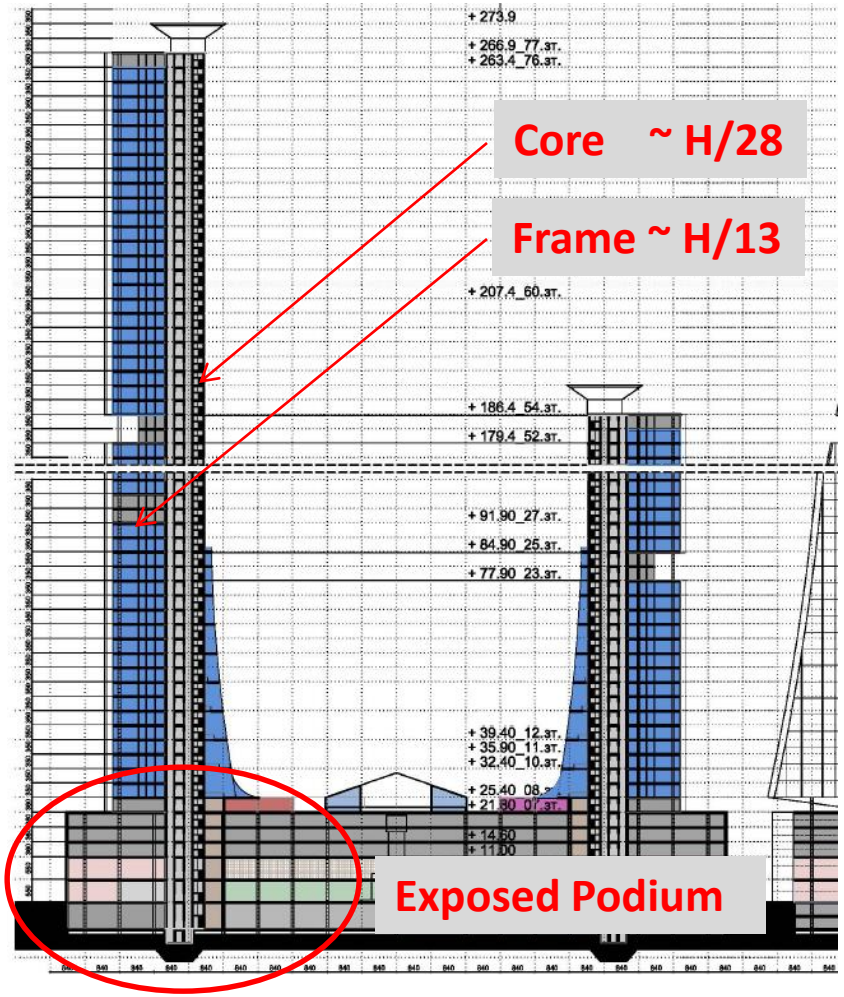
Typical Elongated, Low Rise Efficient Hotel Floor Arrangement



- Three Eccentric Cores in x,y direction
- Columns @ 8,4x8,4m

‘Gala’ Complex – Client/Architect Intent

Extended to a Slender High-Rise.



‘Gala’ Complex – Concept Design

Architect’s governed structural shape:

- **‘Flat shape’ Volume**
- **Three Distributed Slender Cores – H/28**
- **Narrow Building Width – H/13**
- **Columns @8,4x8,4m**
- **Floor to Floor Height 3,5m**
- **Lot of Partition Walls – residential building concept**
- **Podium and Foundation Enlargement Overlapped**

Challange:

Structural Concept for Wind and Earthquake

‘Gala’ Complex – Concept Design development route

A. Cores+Frames Structural Concept

- Three Distributed Slender Cores → Reinf. Concrete (RC)
- Narrow Building Width → Frames (RC or Steel)
- Columns @8,4x8,4m → Frames (RC or Steel)
- Floor Structure → RC/Composite
- Lot of Partition Walls → Light Partitions
- Podium and Foundation Enlargement Overlapped → Particular challenge

Optimization between
Steel vs. Concrete Frames/Floors
Fact:
(It is all about FLOORS: Arch. Details, Speed, MEP, Story Height…)

‘Gala’ Complex – Concept Design

B. Cores+Shear Walls+Flat Slab Structural Concept

- Three Distributed Slender Cores → Reinf. Concrete (RC)
- Narrow Building Width
- Columns @8,4x8,4m → Only for Gravity (RC, Comp.)
- Floor Structure → RC/PT Flat Slab
- Lot of Partition Walls → Shear Walls Optimization
- Podium and Foundation Enlargement Overlapped → Discrete RC Kontraforss
- Damping Devices? → No Damping Devices
- Earthquake Code → Eurocode 8

No Beams-No Frames Concept

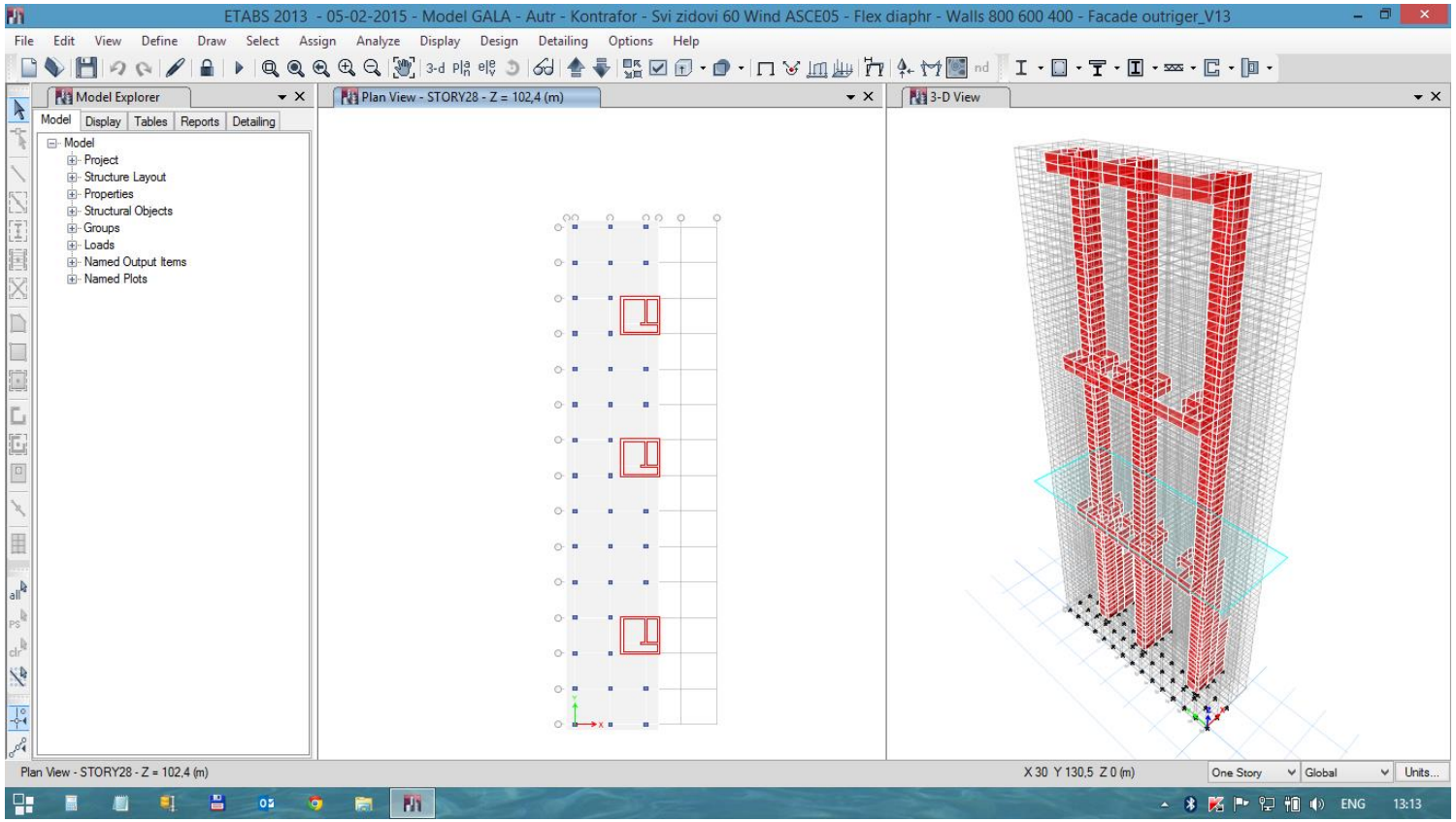
RC Concrete Natural Solution + Fact:

“Except Struct. Engineers, Nobody Else Like Beams/Frames?”

‘Gala’ Complex – Concept fesign

B. Cores+Shear Walls+Flat Slab – ‘Early Works, Feb. 2015.’

Cores + Outriggers + Façade Columns Lateral Concept

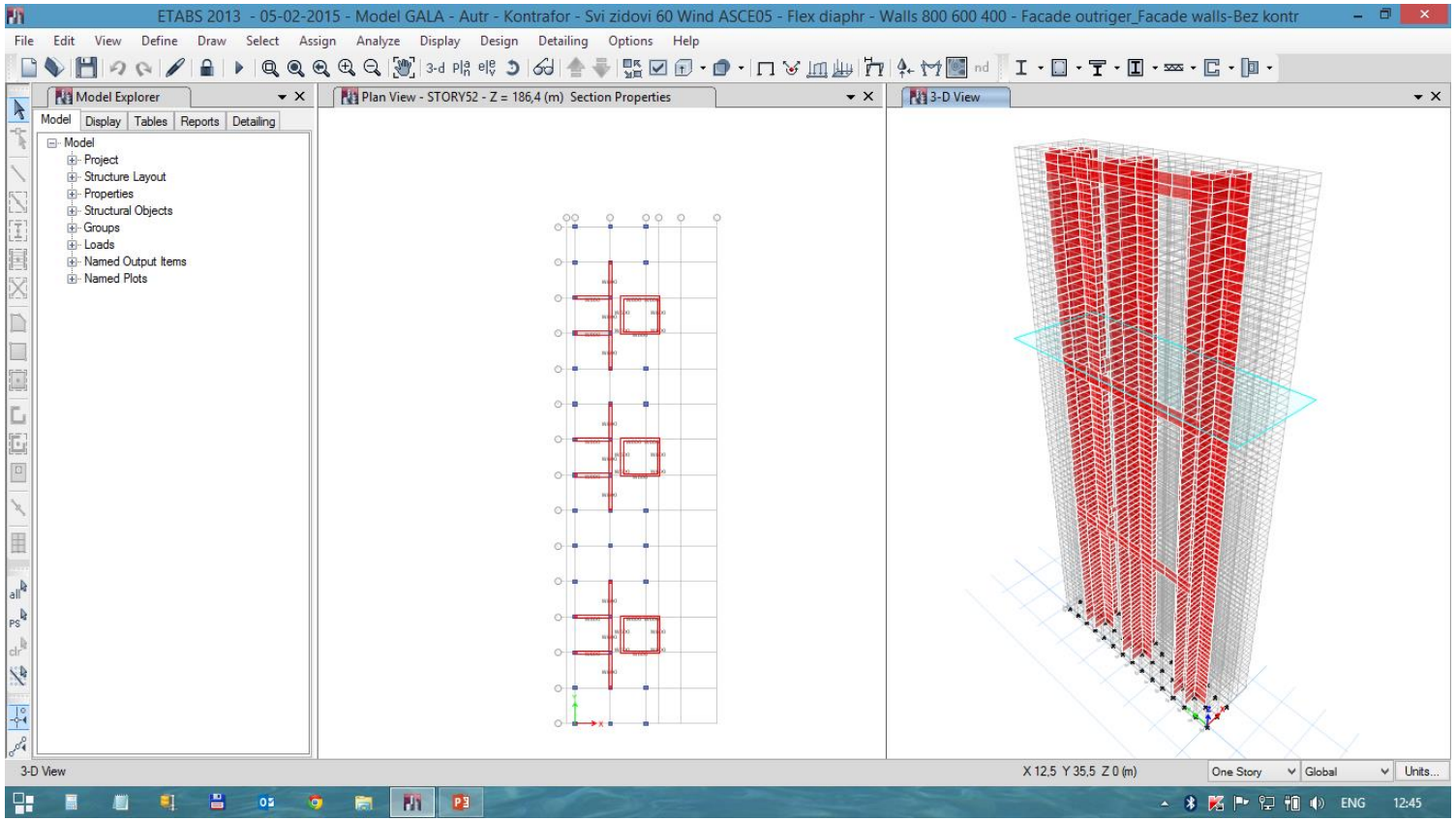


Not good enough, unfortunately ☹

‘Gala’ Complex – Concept Design

B. Cores+Shear Walls+Flat Slab – ‘Early Works, Feb. 2015.’

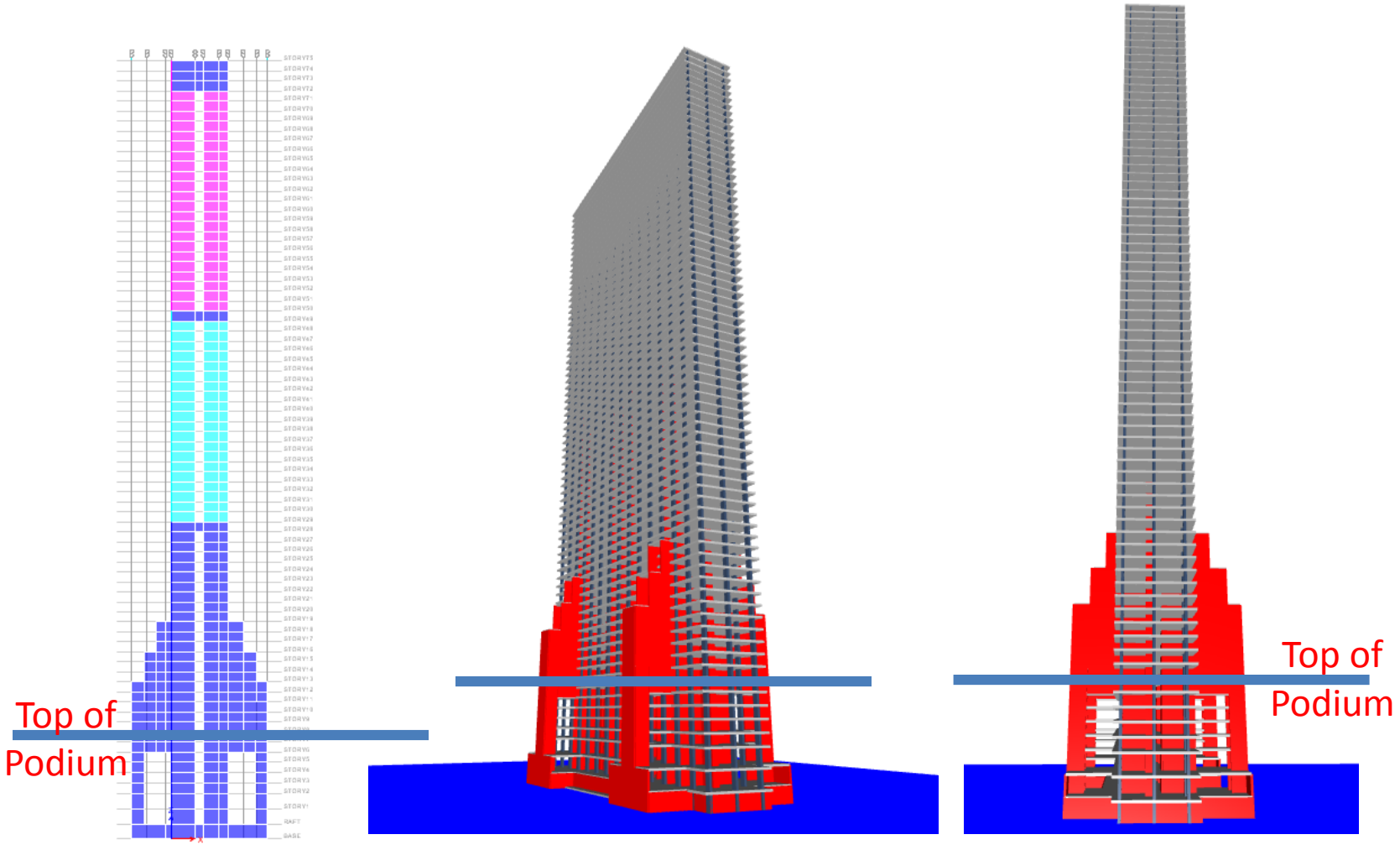
Expanded Cores + Outriggers + Façade Columns Lateral Concept



Better, but Work to be Continued….

‘Gala’ Complex – Concept Design

B. Cores+Shear Walls+Kontraforss – ‘Early Works, Feb. 2015.’

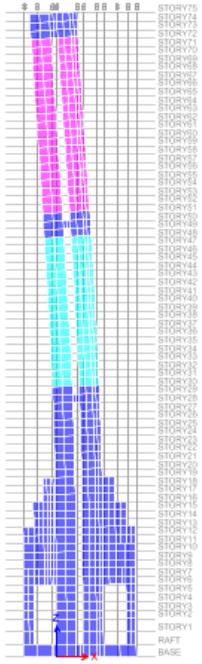


The way forward, Promising! ☺

‘Gala’ Complex – Concept Design

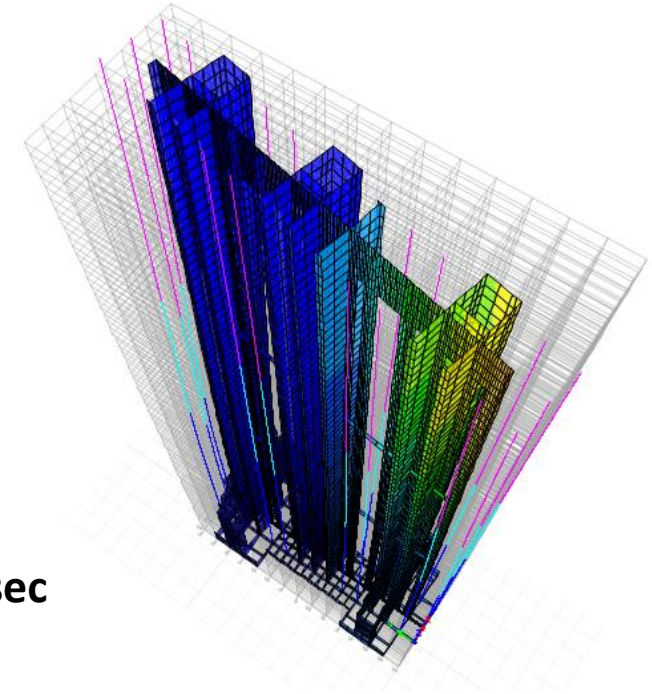
B. Cores+Shear Walls+Kontraforss – ‘Early Works, Feb. 2015.’

Modes of Vibrations



First Mode – T1=6,8sec
Transversal - X

Second Mode – T2=5sec
Longitudinal - Y



Third Mode – T3=5,0sec
Torsional

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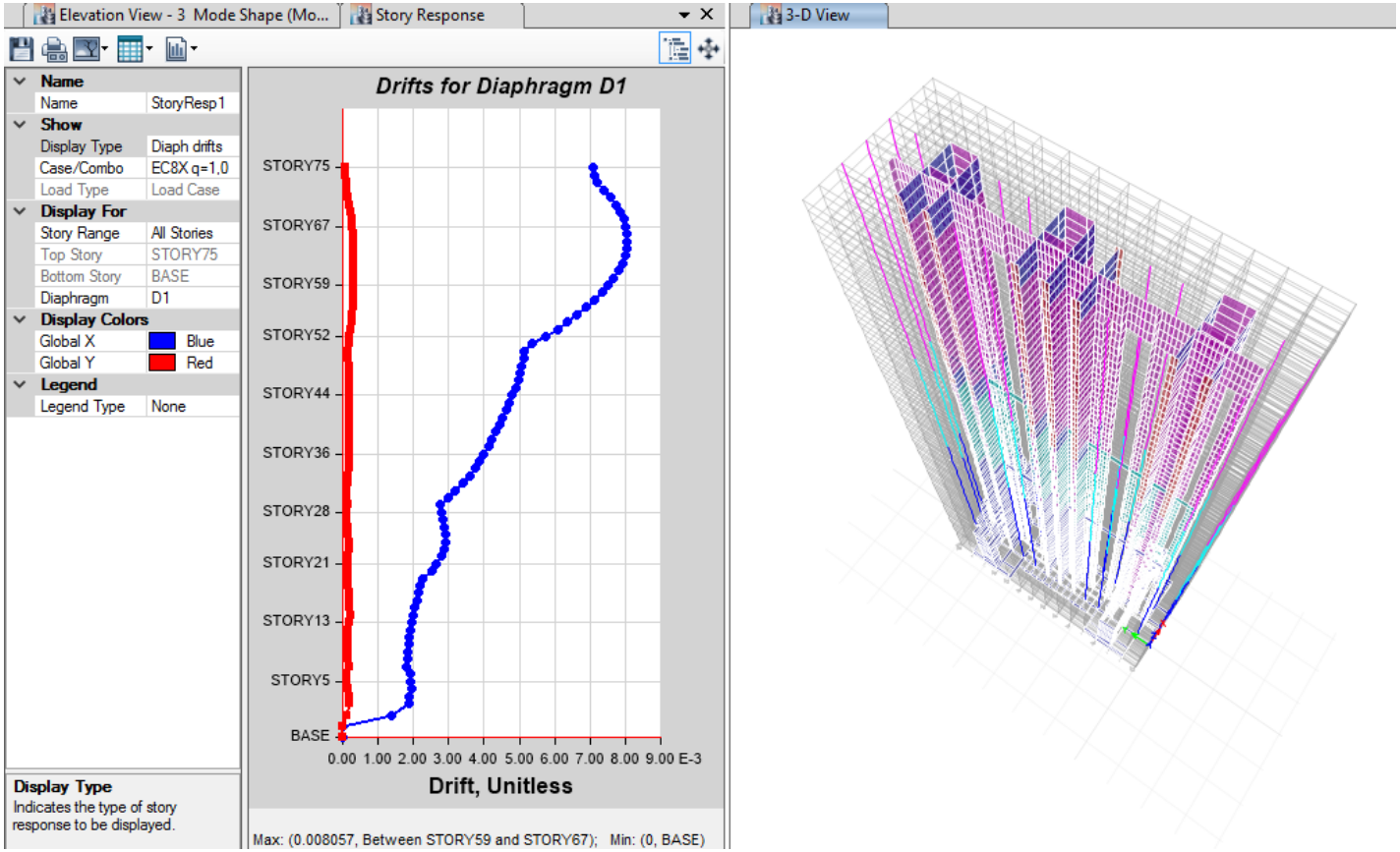
B. Cores+Shear Walls+Kontraforss – ‘Early Works, Feb. 2015.’

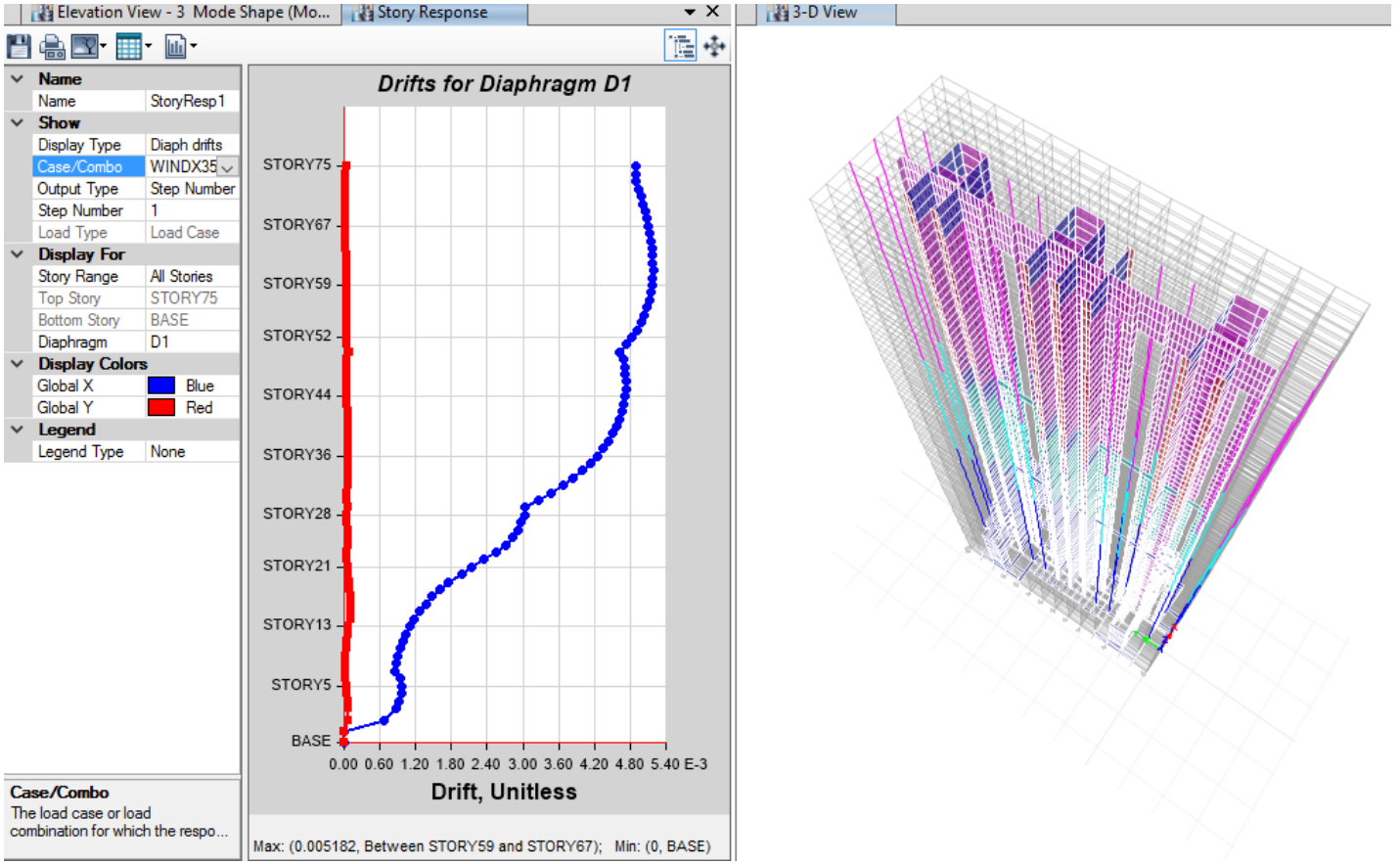
Story Drifts – EC8 Earthquake (<0,008)



‘Gala’ Complex – Concept Design

B. Cores+Shear Walls+Kontraforss – ‘Early Works, Feb. 2015.’

Story Drifts – EC 50Y Wind (<0,005) under full wind - conservative



‘Gala’ Complex – Concept Design

To be Continued in this case as RC core-shear wall structure?

Thank You!