Concrete Wall Optimization In Use Of A Large-scale Base Isolated Hospital Building

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Introduction

- Ikitelli City Hospital (Başakşehir)
- Located in Istanbul, Turkey
- Total Floor Area ~ 1,000,000 m²
- 3 Specialty Towers, 6 clinics
- Supported on ~ 2,000 isolators (World’s Largest Base Isolated Structure)
- Special Reinforced Concrete Shear Walls
- Estimated Completion 2020
Concrete Optimization

Floor Plan Efficiency

- Story Drifts
- Shear stresses
- Accelerations
- Etc.

Concrete Volume & Construction Cost

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## Superstructure Period vs. Base Isolation Period

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Story Drift</th>
<th>Acceleration</th>
<th>Shear Stress</th>
<th>Summary</th>
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### Summary
- **Too Costly to Achieve, Architectural Limitations**
- **Preferred Target Period**
- **Does Not Satisfy**

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### Table

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<thead>
<tr>
<th>Base Isolation Period</th>
<th>Superstructure Period</th>
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Wall Groups and Thicknesses

5 thicknesses + 9 wall groups = 1,953,125 models

180 models

Top walls: 400-mm
Bottom walls: 800-mm
$\Delta t \leq 200$-mm
Model Conversion

~ 30 Minute Runtime Per Model (90 Hours Total)

~ 6 Minute Runtime Per Model (18 Hours Total)
Modeling & Analysis Automation

1. Duplicate Model (180)
2. Assign Wall Thicknesses
3. Run Analysis
4. Export Results
5. Upload Results to Database

~ 18 Hours

- Modal Periods
- Volume of Concrete
Finding Optimized Solution
Visualization & Web Interface
Visualization & Web Interface
Design Process

ETABS Model (Linear Analysis)

Strand 7 Model (Optimization)

MySQL

LS-Dyna Model (NLTHA)

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Thank You.