IPRO 315
DESIGN OF A LARGE SCALE STRUCTURE

Presented by:
Corina Abrudan
Chris Adams

Instructors:
Jorge Cobo
J. Shen
J. Budiman
IPRO 315
Phantasy Hotel

- PROJECT OVERVIEW
- TEAM ORGANIZATION
- ARCHITECTURAL GROUP
- MECHANICAL GROUP
- STRUCTURAL GROUP
Objective:
Design a 22-story hotel located in Oakbrook, IL.
### PROBLEM ORGANIZATION

#### STRUCTURAL
- FOUNDATION SITE
- ICB CODE
- SAP2000 MODEL
- LOAD CASES

#### ARCHITECTURAL
- INITIAL DESIGN
- FLOOR PROGRAM
- FLOOR PLANS
- FINALIZE DESIGN

#### MECHANICAL
- MEP CODES
- HVAC CALC

### PRELIMINARY (ARCH DESIGN) PHASE

#### ENGINEERING DESIGN PHASE
- FINALIZE LOADS
- FINALIZE MODEL
- DESIGN STEEL
- FOUNDATION
- GREEN ROOF DESIGN
- FAÇADE DESIGN
- AESTHETIC DESIGN
- FINALIZE SCHEDULE

#### END PHASE
- FINALIZE SCHEDULE
- FINILIZE PLANS
- SCALE MODEL
- MEP ROUTING
- MEP SCHEDULE
Major Ideas

- Create detailed floor plans and wall sections
- Build a physical model
- Create a sustainable Green Roof
- Floor by floor layout that accommodates the needs of the community
  - Restaurant,
  - Conference Center,
  - Ballroom

Challenges

- Difficult to design without exact site location
- Designing the layout based on the given shear wall drawing
IPRO 315
Phantasy Hotel

Building Program Diagram section

**Floor Heights:**
- Hotel rooms: 13'
- Ballroom: 19'
- Restaurant: 16'
- Cafe': 13'
- Mechanical/Security: 19'
- Conference Rooms: 16'
- Gym: 16'
- Offices: 13'
- Lobby: 19'

**Building Program Layout:**
- Hotel rooms: (floors)
  - (A-107) - 9, 12, 15, 18
  - (A-108) - 10, 13, 17, 20
  - (A-109) - 7, 8, 14, 16, 19
- Ballroom: floor 22
- Restaurant: floor 21
- Cafe': floor 11
- Mechanical/Security: floor 6
- Conference Rooms: floor 5
- Spa/Locker Rooms: floor 4
- Gym: floor 3
- Offices: floor 2
- Lobby: floor 1
Typical Guest Floor Layout with Elevator/Stair Shafts and Bedrooms
First Floor Lobby
Green Roof
<table>
<thead>
<tr>
<th>Major Ideas</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Design HVAC System for sustainability</td>
<td>• Utilization of space efficiently to fit necessary equipment</td>
</tr>
<tr>
<td>• Design Plumbing and Electrical Routing</td>
<td>• Selection of appropriate equipment to meet building code requirements</td>
</tr>
<tr>
<td>• Mechanical Room Design around given Shear Walls</td>
<td>• Incorporating Energy Recovery where Possible</td>
</tr>
</tbody>
</table>
**IPRO 315**

**Phantasy Hotel**  
**Structural Group**

### Major Ideas
- Analysis of all load cases
- Design steel columns and composite steel beams to resist multiple loads
- Working Finite Element model
- Concrete spread footings and caissons

### Challenges
- 20 possible load cases
- Adjusting models to accommodate deviations from original plan
Finite Model and Loading
Foundation Design
Conclusion

✓ PROJECT OVERVIEW
✓ TEAM ORGANIZATION
✓ ARCHITECTURAL GROUP
✓ MECHANICAL GROUP
✓ STRUCTURAL GROUP
QUESTIONS