

MAJOR IDEAS INCORPORATED INTO DESIGN

Architectural

- Kitchen and formal restaurant
- Exercise room and spa area
- One floor for hotel administrative offices
- Green roof and outdoor area at the top floor
- Ballroom

Structural

- Concrete spread footings and caissons for the foundation
- Reinforced concrete shear walls forming the core of the building, designed to resist gravity and lateral loads imposed on the structure
- Steel columns and composite steel beams designed to resist multiple loads

Mechanical

- Heating Ventilation and Air Conditioning
- Mechanical Electrical and Plumbing systems
- Electrical equipment and accessories

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 8
Conference Rooms: floor 5
Spa/Locker Rooms: floor 4
Gym: floor 3
Offices: floor 2
Lobby: floor 1

TEAM

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ACKNOWLEDGEMENTS

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IPRO 315

OBJECTIVE

The purpose of this IPRO is to design a 22 story hotel located in the western suburbs of Oakbrook, IL. The group will use their skills in Architectural, Structural, and Mechanical engineering to efficiently design this structure.



DELIVERABLE

Applied knowledge gained through prior coursework to design the large structure according to AISC, IBC, and ASCE-7 code. Additionally, we designed the building for sustainability.

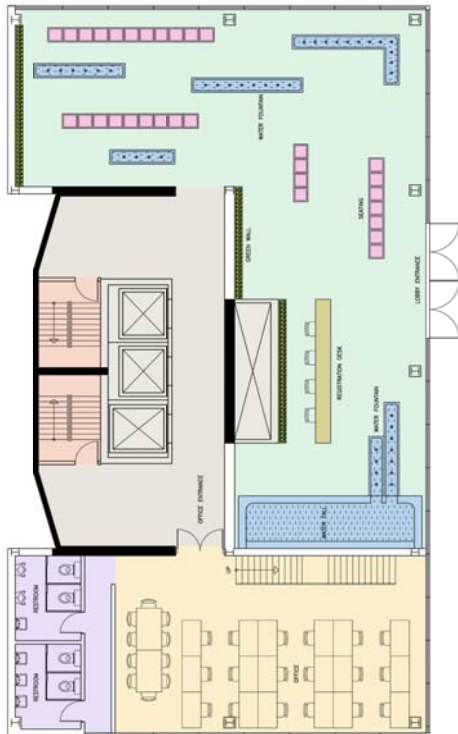
ARCHITECTURE

DELIVERABLES

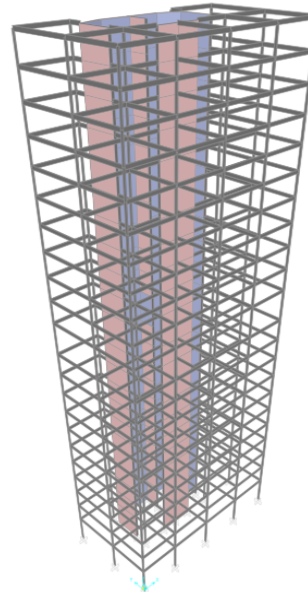
- DETAILED FLOOR PLANS AND WALL SECTIONS
- FLOOR BY FLOOR LAYOUT TO ACCOMMODATE A BROAD RANGE OF NEEDS IN THE COMMUNITY
- PHYSICAL MODEL OF THE STRUCTURE IN ITS ENTIRETY
- SUSTAINABLE GREEN ROOF

CHALLENGES

- DIFFICULT TO DESIGN WITHOUT EXACT SITE LOCATION
- DESIGNING LAYOUT BASED ON THE GIVEN FOOTPRINT OF THE STRUCTURAL FRAME



STRUCTURAL



DELIVERABLES

- ANALYSIS OF ALL LOAD CASES, INCLUDING DEAD, LIVE, WIND, AND SEISMIC LOADING
- MAIN STEEL MEMBERS OF THE STRUCTURE SUCH AS BEAMS, COLUMNS, AND GIRDERS
- WORKING FINITE ELEMENT MODEL OF THE STRUCTURE OF THE HOTEL INCLUDING ALL OF THE LOAD COMBINATIONS IN ACCORDANCE WITH THE IBC CODE FOR THE PURPOSE OF ANALYSIS

CHALLENGES

- OVER 20 POSSIBLE LOAD CASES, NARROWED TO 7 GENERAL CASES USED IN ANALYSIS
- ADJUSTING MODELS TO ACCOMMODATE DEVIATIONS FROM ORIGINAL PLAN

MECHANICAL

DELIVERABLES

- HVAC DESIGN FOR SUSTAINABILITY, DUCTWORK ROUTING
- PLUMBING AND ELECTRICAL ROUTING DESIGN
- MECHANICAL ROOM DESIGN AROUND SHEAR WALLS

CHALLENGES

- UTILIZATION OF AVAILABLE SPACE EFFICIENTLY IN ORDER TO FIT NECESSARY EQUIPMENT
- SELECTION OF APPROPRIATE EQUIPMENT IN ORDER TO MEET BUILDING LOAD REQUIREMENTS BASED ON EQUIPMENT EFFICIENCY AND FOOTPRINT
- INCORPORATING ENERGY RECOVERY WHERE POSSIBLE

