

I^{PRO} 315

Design of a Large Scale Structure

Architectural Rendering



Objective

- ❑ To design a sustainable modern and efficient residential building on Illinois Institute of Technology's campus, replacing an outdated and unsightly graduate dorm.
- ❑ Use advanced design techniques to facilitate both the initial design and subsequent revisions.

Team Organization

- ❑ Structural Design & Analysis
 - ❑ Responsible for design of a complete structural system incorporating precast structural concrete.
- ❑ Foundations
 - ❑ Responsible for the analysis of existing soil conditions and design of a foundation system and basement structure for the proposed building.
 - ❑ Responsible for design of an earth retention structure.

Structural Design

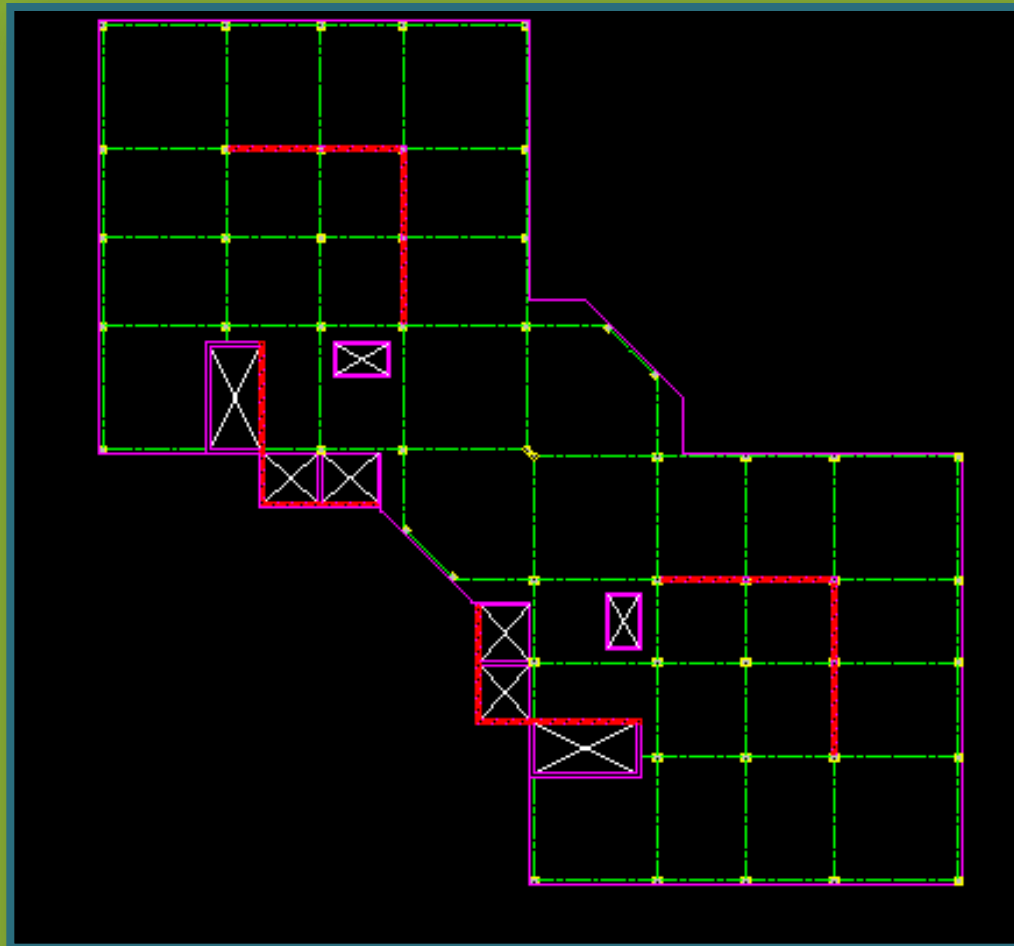
□ Limitations

- For sustainability and efficiency, use precast concrete as much as possible
- Building design was determined by architects of IPRO 335, featuring:
 - Staggered towers at levels 13, 14, 17
 - Large atriums
 - Balconies
 - Green roof
 - Heavy mechanical equipment at roof and basements

Structural Design & Analysis

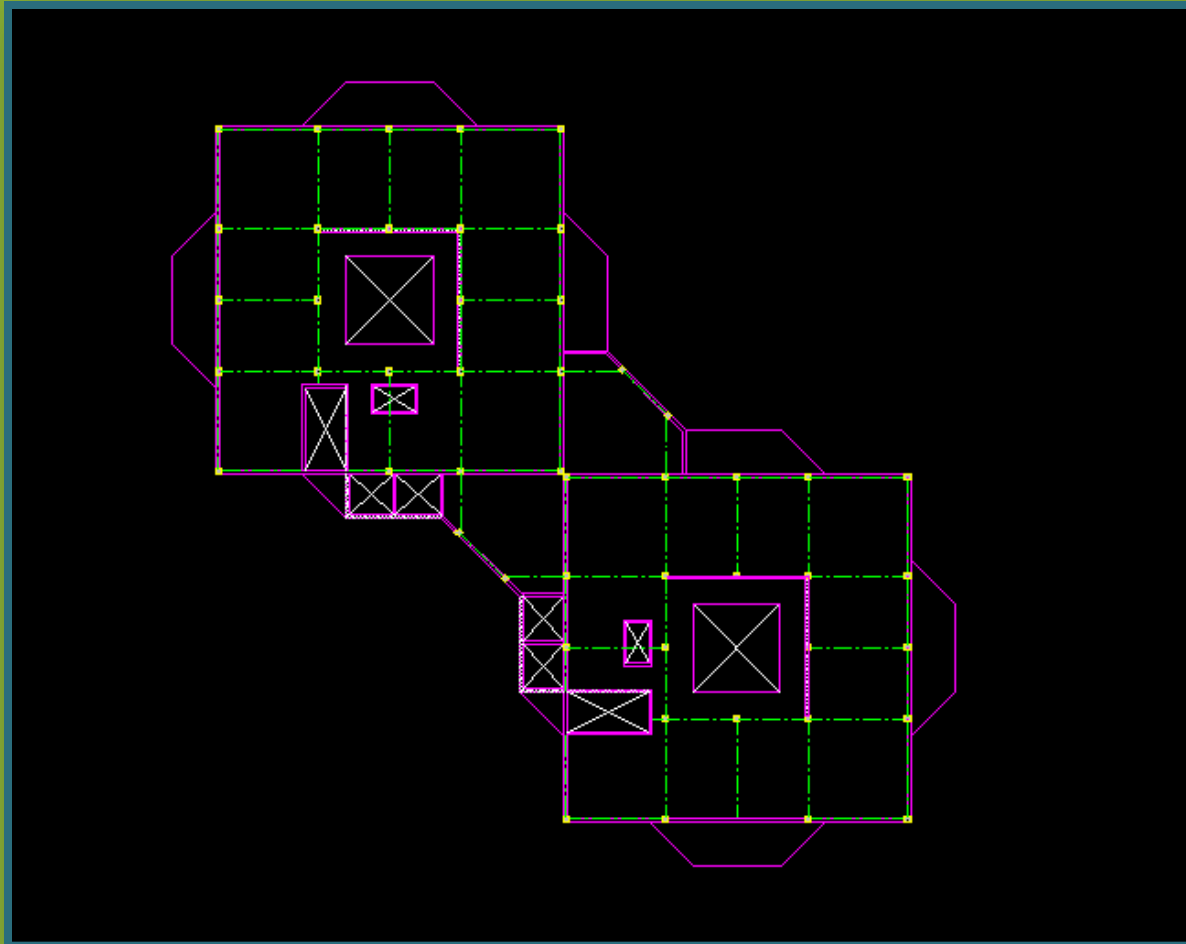
- Gravity Load Bearing System
 - Hollowcore precast and cast-in-place floor slabs
 - Precast and cast-in-place beams
 - Cast-in-place columns
- Lateral Load Resisting System
 - Shear wall and moment frame dual system
 - Integrated columns to make walls non-load-bearing

Structural Layout



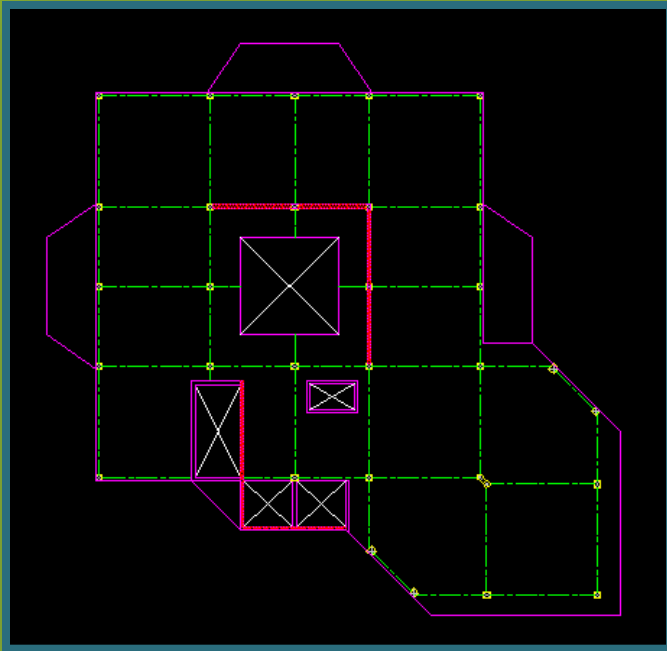
Floor 1

Structural Layout

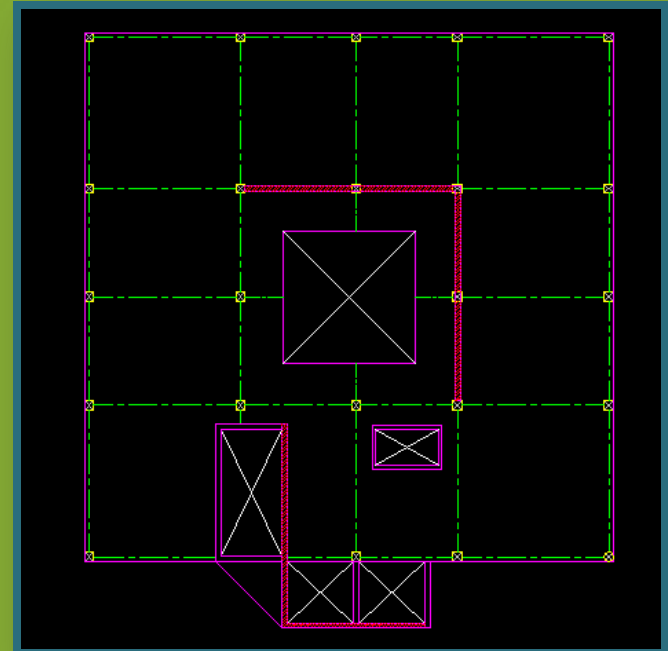


Floors 2-13

Structural Layout

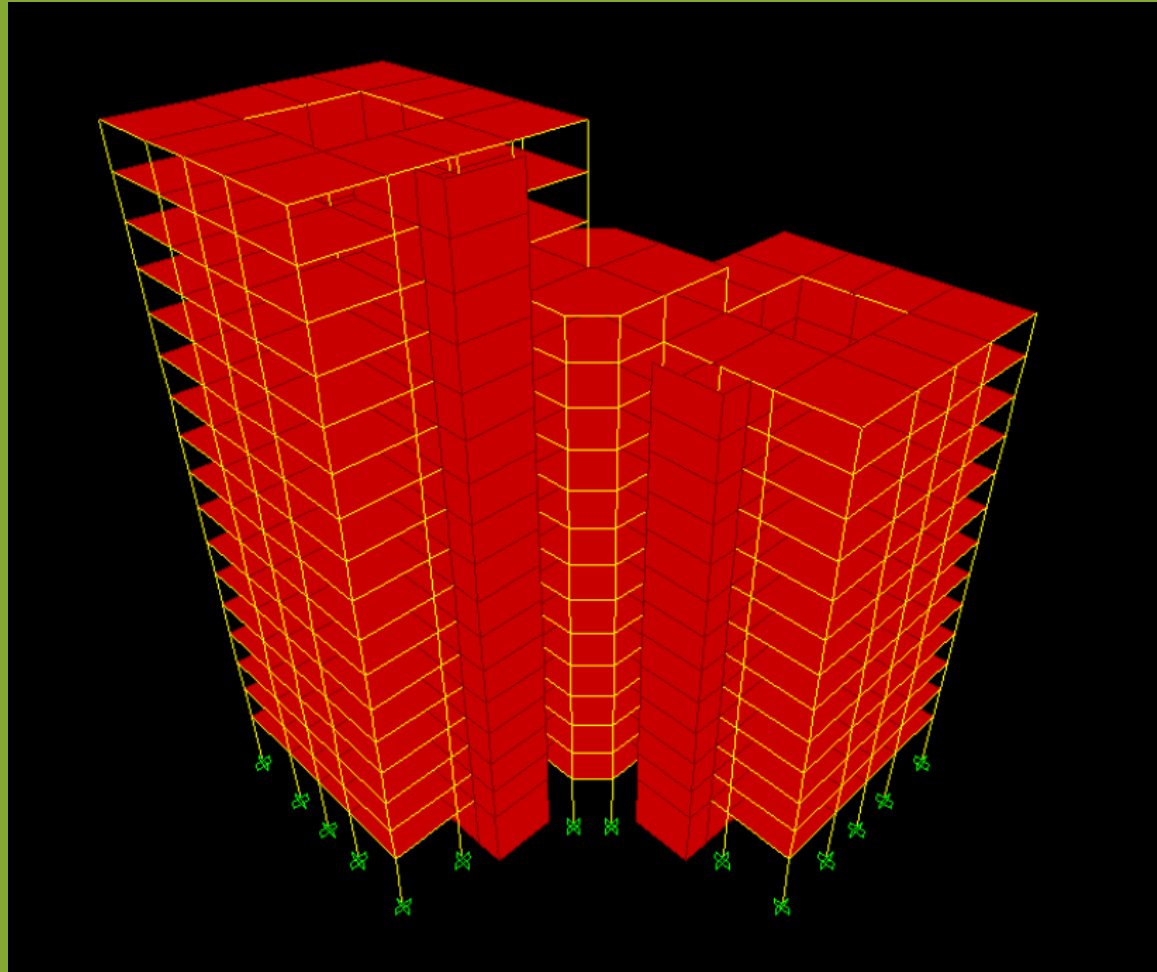


Floor 14



Floors 15-17

Structural Model



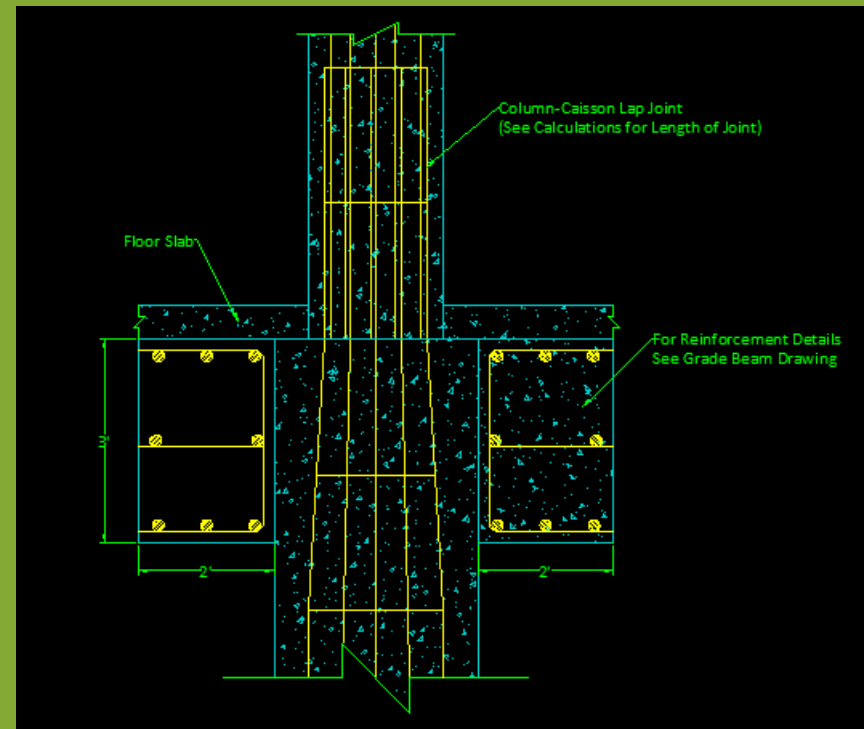
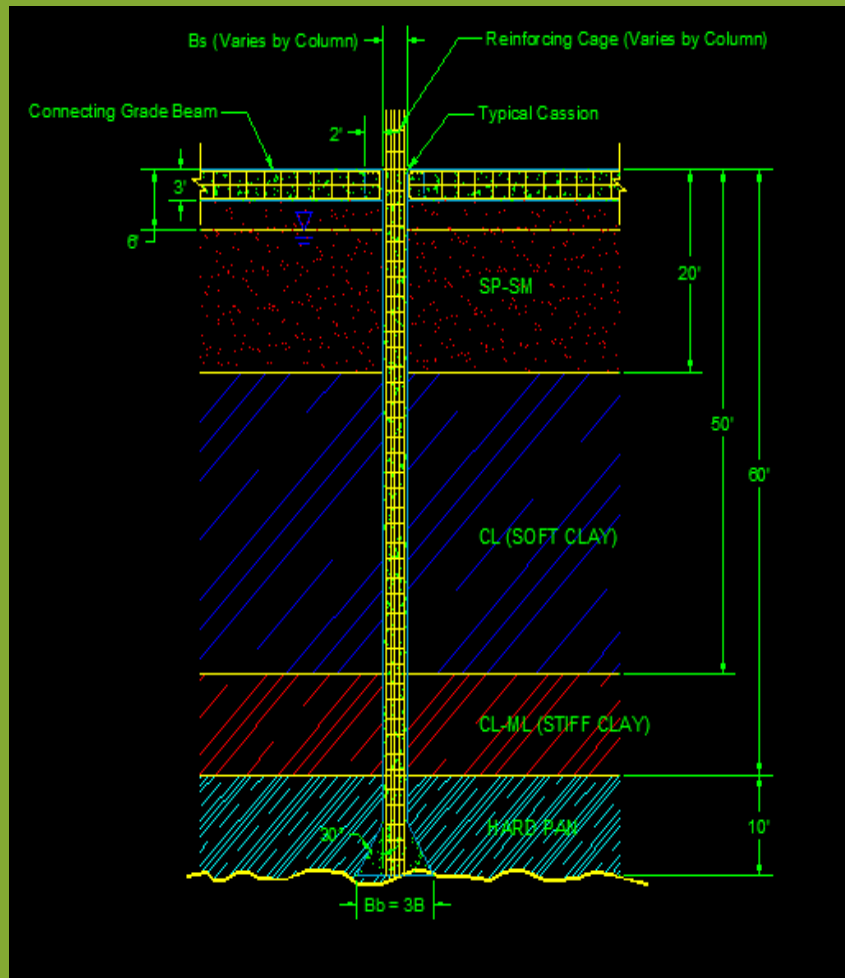
Foundations

- ❑ Selection of Foundation System
 - ❑ Drilled reinforced concrete caissons extending to the hardpan layer
 - ❑ Sheet pile retaining structure and dewatering system to allow construction below the ground water table
 - ❑ Construction methods used to minimize site impact and disturbances to surrounding area.

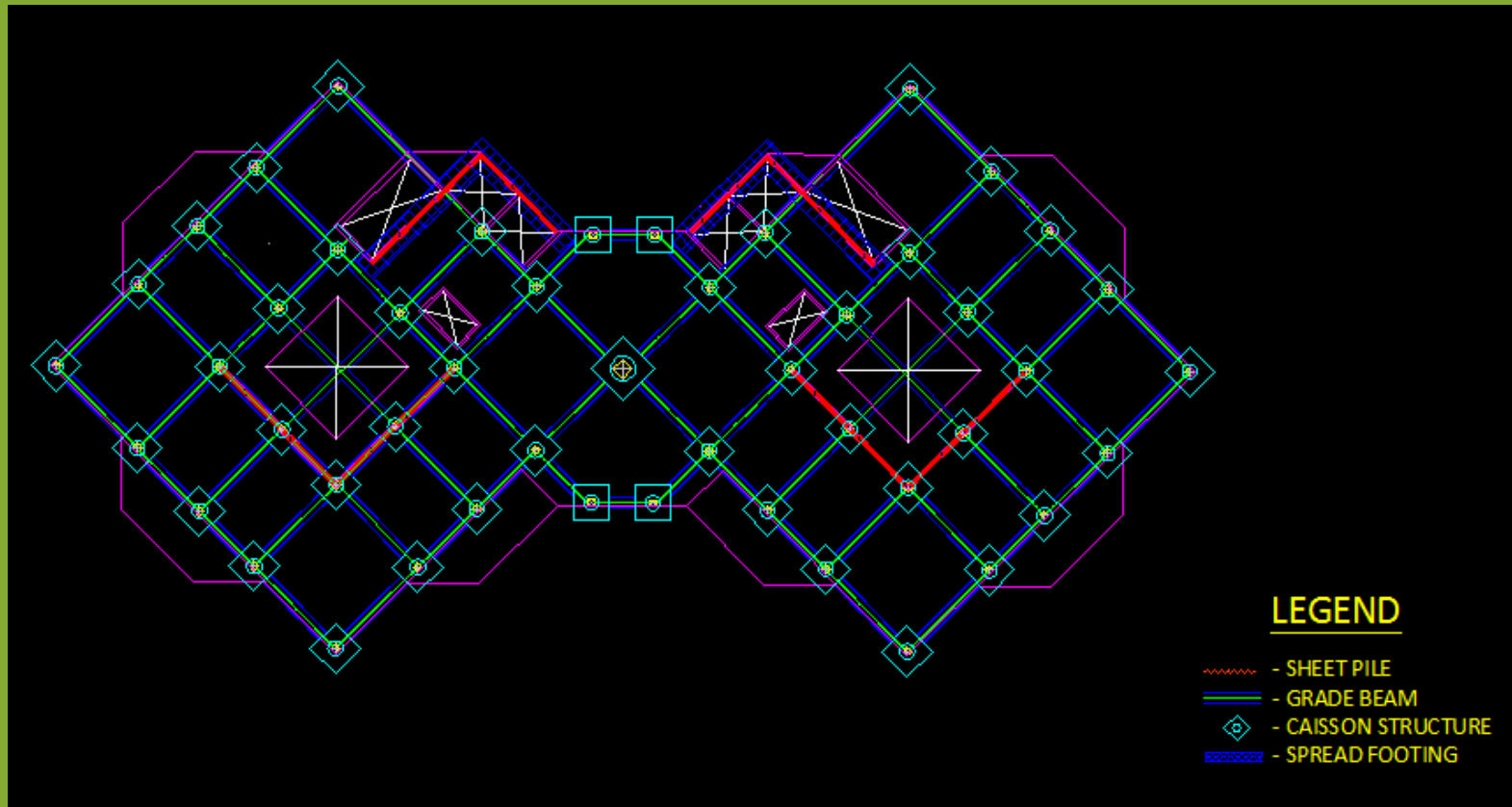
Foundations

- ❑ Research and analysis of existing conditions
 - ❑ Obtained soil boring logs from MTCC construction defining the properties and depth of the soil strata.
 - ❑ Acquired existing site plan and utilities map from IIT Facilities department
- ❑ Design of foundations and sheet pile
 - ❑ Drilled shaft foundations and connecting grade beams were designed using ACI 318-08 and CBC.
 - ❑ Sheet pile retaining wall structure designed using computer programs

Drilled Shaft Design



Foundation Layout



Questions?

