

NEW YORK CITY COLLEGE OF TECHNOLOGY

Fall 2014



**ARCH 1230 BUILDING TECHNOLOGY II
COURSE OUTLINE**

COURSE COORDINATOR - PROFESSOR JASON MONTGOMERY

DEPARTMENT OF ARCHITECTURAL TECHNOLOGY

ARCH 1230

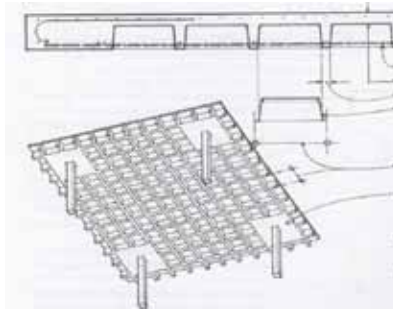
BUILDING TECHNOLOGY II

1 classroom hour, 4 lab/studio hours, 3 credits

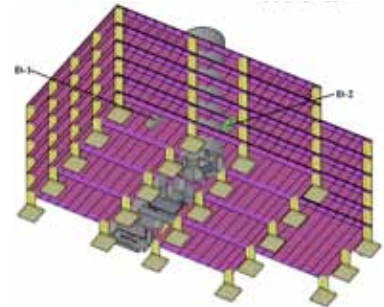
Course Description: This course will study the basic materials of construction as well as the theory and practice of building technology. The course will include investigation of the assembly of building components and methods of construction while developing proficiency in both analog and digital drawing building information modeling (BIM) techniques, and professionally presented construction drawing page composition.



LECTURE



READING + QUIZ



ASSIGNMENT

Course Context: This is the second course in the Building Technology sequence required for both the AAS and the BTech degrees offered by the Department of Architectural Technology. Each course in this sequence is a prerequisite for the following course. There are four Building Technology courses.

Prerequisites: ARCH 1130 Building Technology I with a grade of C or higher

Required Texts:

Allen, Edward and Joseph Iano. *Fundamentals of Building Construction: Materials and Methods, 5th Edition*. John Wiley and Sons, 2008.

Ching, Francis. *Building Construction Illustrated, 4th Edition*. John Wiley and Sons, 2008.

Recommended Texts:

Ramsey, Charles George, Harold Reeve Sleeper, and Bruce Bassler. *Architectural Graphic Standards: Student Edition (Ramsey/Sleeper Architectural Graphic Standards Series)*. John Wiley and Sons, 2008.

Ching, Francis. *Architectural Graphics, 5th Edition*. John Wiley and Sons, 2009.

Attendance Policy: No more than 10% absences are permitted during the semester. For the purposes of record, two lateness are considered as one absence. Exceeding this limit will expose the student to failing at the discretion of the instructor.

Academic Integrity: Students and all others who work with information, ideas, texts, images, music, inventions and other intellectual property owe their audience and sources accuracy and honesty in using, crediting and citation of sources. As a community of intellectual and professional workers, the college recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension and expulsion.

Course Structure: This course will combine weekly lectures focused on particular materials and methods of construction and studio lab time to acquire hand sketching and digital drafting and modeling skills while developing a series of case drawing and modeling investigations of the materials and assemblies discussed in the lectures. There will be one or more research assignments as well as several quizzes based on key terms and concepts discussed in the class and in the assigned readings. There will be a comprehensive final exam. A portfolio will be developed to document the studio lab work as the semester progresses. Field trips will offer first hand on-site investigation of the materials and methods covered in the course.

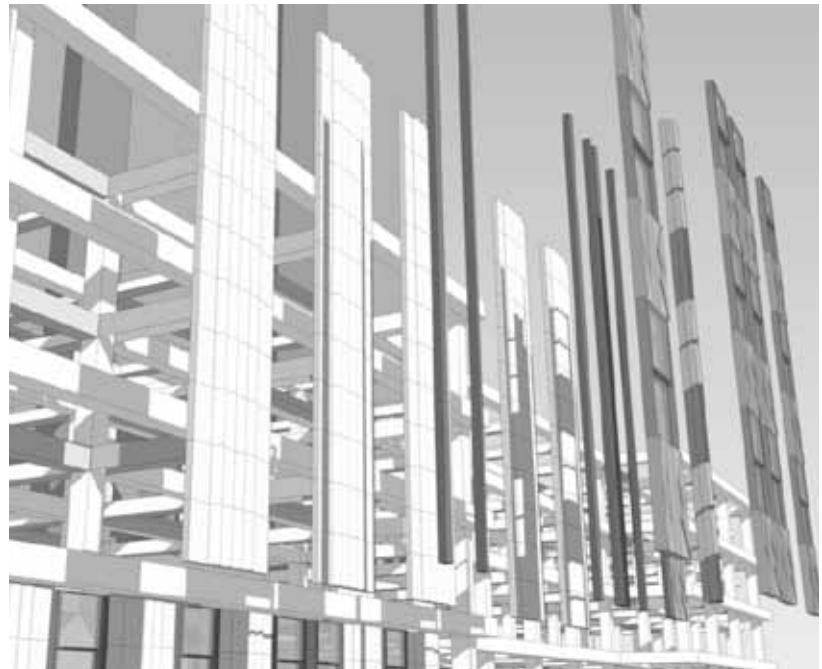
GRADE WEIGHTING

60% Studio Lab Assignments

10% Quizzes

25% Final Exam

5% Class Participation



LEARNING OBJECTIVES

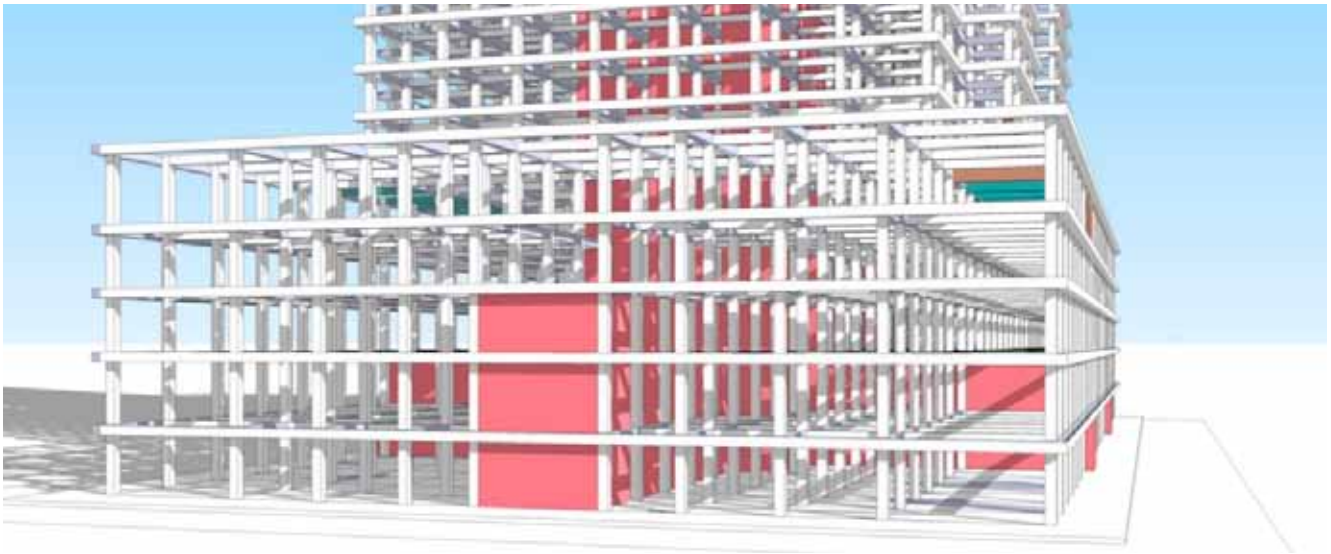
Upon successful completion of this course, the student will:

1. **Understand** the relationship of technology to tectonics and architectural character. (Knowledge)
2. **Recall and recite** the key terms and characteristics of the materials reviewed in the lectures and readings. (Gen Ed)
3. **Develop and apply** a professional vocabulary of architectural terminology. (Gen Ed)
4. **Understand and apply** professional etiquette to classroom situations. (Gen Ed)
5. **Define and compare** the environmental implications of specific materials and types of construction including embodied energy, sourcing, and the processing of materials. (Gen Ed)
6. **Generate** clear and concise talking points to guide oral presentations of lab assignment reviews. (Gen Ed)
7. **Manipulate and apply** geometric, proportional and scale systems. (Gen Ed)
8. **Apply** an understanding of the relationship of physiology and anatomy to building construction. (Gen Ed)
9. **Research, report on and apply** appropriate details of the selected materials and methods of construction through review of professional literature. (Gen Ed)
10. **Use and apply** procedural texts to supplement instruction on the use of hardware and software. (Gen Ed)
11. **Sketch and draft** details in orthographic and 3 dimensional views in analogue and digital media. (Skill)
12. **Develop** analog and digital models of construction assemblies. (Skill)
13. **Analyze** assemblies and details; demonstrate an understanding of fundamental construction types both by detailed research and visual observation. (Skill)
14. **Demonstrate** knowledge of building codes, professional construction drawing standards for composition, title blocks, annotation, and schedules. (Skill)
15. **Develop** a coordinated drawing set for the given building design(s) including plan diagrams, sections, and details of steel and concrete structures that illustrates and identifies the materials and construction types. (Skill)

ASSESSMENT

To evaluate the students' achievement of the learning objectives, the professor will do the following:

1. Review research assignment focused on the analysis of assemblies and details and the relationship of technology to tectonics, human scale, and architectural character. (Los: 1, 8, 13)
2. Test the students' ability to recall and recite the key terms and material of the readings and lectures through weekly quizzes and a final exam. (Los: 2, 5, 9)
3. Review students' drawing and modeling work where students must exhibit their visual representation skills (2-D and 3-D). (Los: 7, 10, 11, 12, 14, 15)
4. Assess the students' use of professional vocabulary and etiquette during discussions, studio work, and oral presentations. (Los: 3, 4, 6)
5. Inspect student submissions for quality of drafting including use of line weights, lettering, and proper use of scale. (Los: 7, 11, 14, 15)
6. Confirm the proper coordination of the students' submitted drawing sets. (Los: 14)
7. Review the quality and accuracy of the students' submitted analogue and digital models of construction assemblies. (Los: 11, 12)



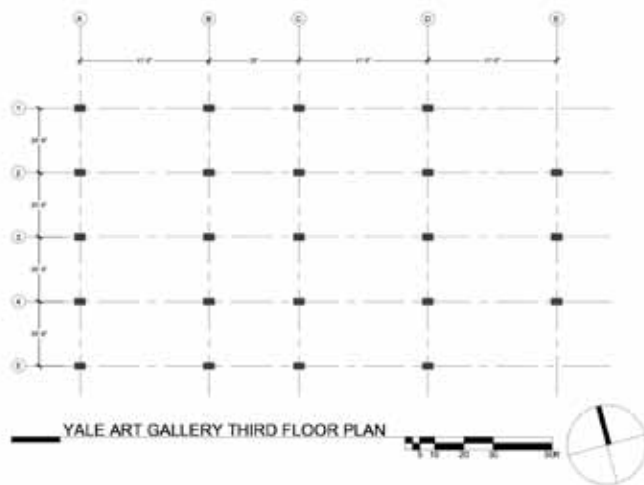
WEEK BY WEEK SUMMARY

WEEK 1:

Week 1 Lecture: Course Introduction, Making Buildings: Materials and Systems: Introduction to the scope of this course. Discussion on tectonics, sustainability, and economics as context for the work of the architect. Discussion on nature of materials + selecting construction systems, inherent properties. Introduction to steel and concrete. Structural behavior of steel and concrete with concepts of statics, stress, bending, span and shapes.



Week 1 Lab: Review of Lab Required Equipment and Protocols for Presentation: Architectural Drawing Sets + Modeling: analog and digital tools and techniques. SketchUp, AutoCAD and BIM Software. **Introduction** Initial Drawing Assignment.



Week 1 Homework: Complete Initial Drawing Assignment

Week 1 Reading:

Ching, Building Construction Illustrated, Chapter 1, pp. 1.02-1.06, Chapter 2, pp. 2.02-2.30, Chapter 12, pp. 12.02-12.05, 12.08-12.09

WEEK 2:

Week 2 Lecture: Concrete Construction: History, cement and concrete, making and placing concrete, formwork, reinforcing, creep, prestressing, and innovations.



Week 2 Lab: AutoCAD + Sketchup Fundamentals. Introduce Minor Case Study Assignment A

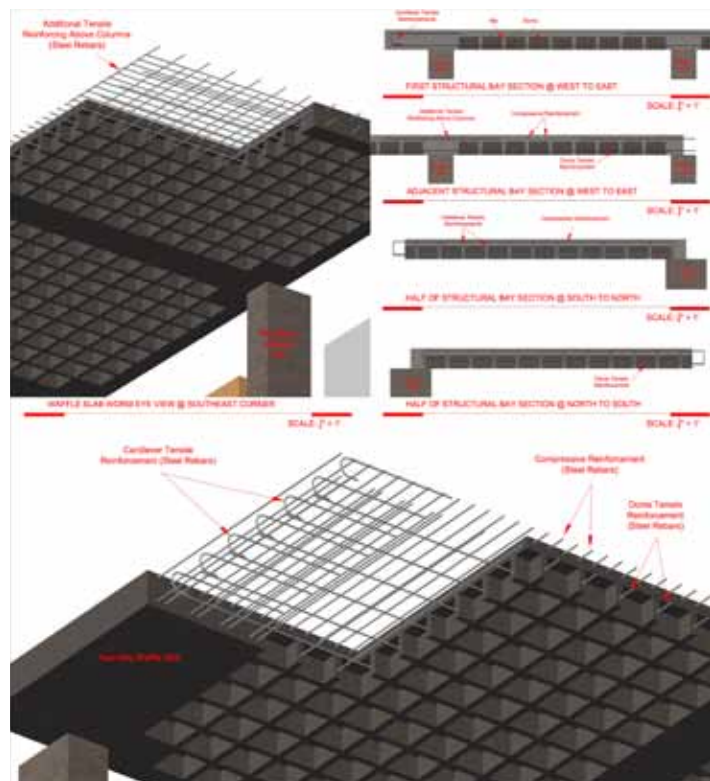
Week 2 Homework: Minor Case Study Assignment A

Week 2 Quiz: **Ching**, Chapters 1, 2, 12

Week 2 Reading:

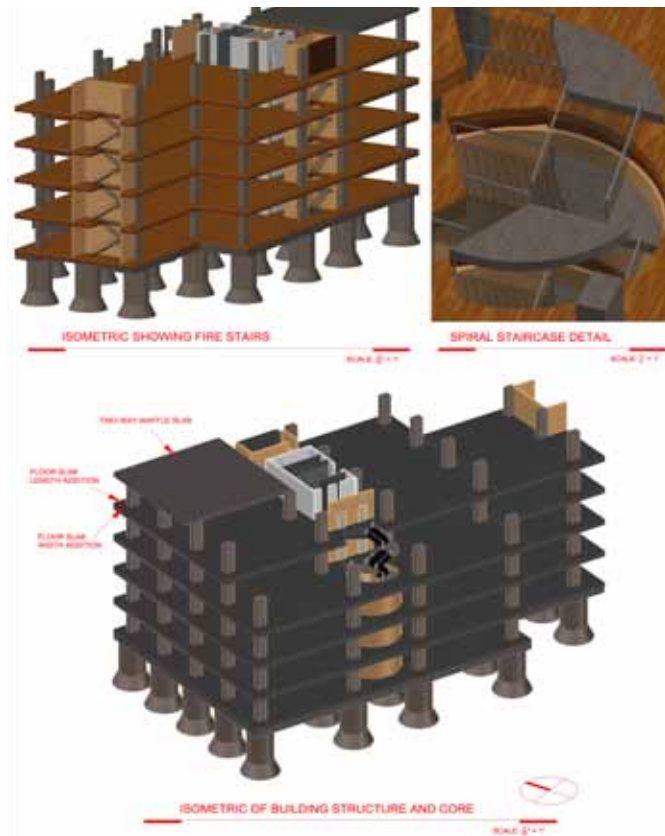
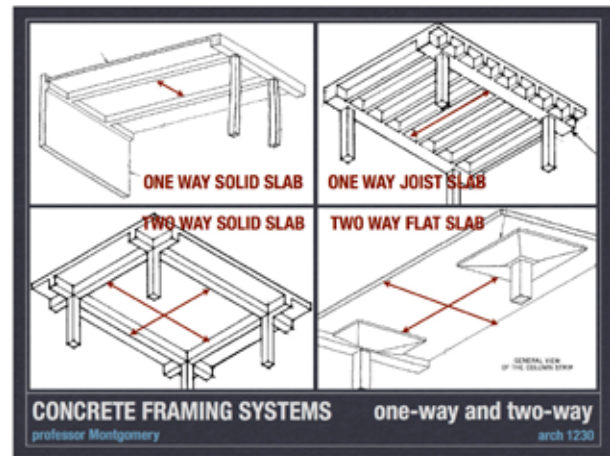
Allen and Iano, Concrete Construction
Chapter 13, pp. 515-551

Ching, Building Construction Illustrated,
Chapter 5, pp. 5.04-5.09,
Chapter 12, pp. 12.04-12.05



WEEK 3:

Week 3 Lecture: Site Cast Concrete Construction: Slab on grade, concrete walls, concrete columns, one-way systems, two-way systems, stairs, posttensioning, selecting a system, innovations, architectural concrete.



Week 3 Lab: AutoCAD + Sketchup Fundamentals. Review Minor Case Study Assignment A Progress

Week 3 Homework: Complete Minor Case Study Assignment A

Week 3 Quiz: Allen and Iano, Chapter 13, **Ching**, Chapters 5 & 12

Week 3 Reading:

Allen and Iano, Sitecast Concrete Framing Systems, Chapter 14, pp. 553-609

Ching, Building Construction Illustrated, Chapter 4, pp. 4.02-4.13

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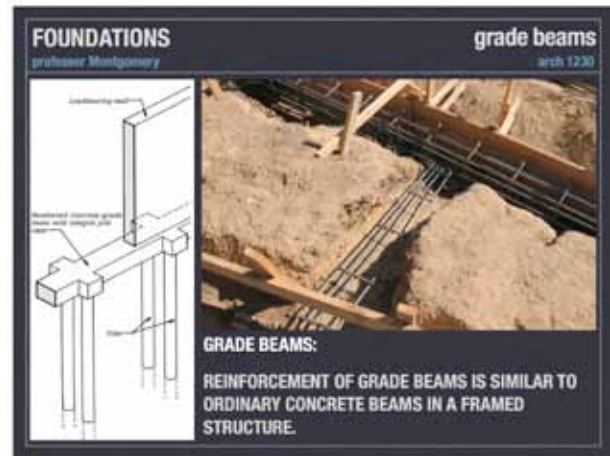
WEEK 3:

Week 3 Field Trip: Case Study Building Yale Center for British Art 1111 Chapel Street, New Haven, CT
Required weekend trip. Students to investigate YCBA using sketchbooks and professional quality cameras provided by Perkins Grant funding. Also to visit Yale University Art Gallery, Art and Architecture Building, Beineke Library, and Ingalls Rink. **Sketchbook and drawing materials required.**



WEEK 4:

Week 4 Lecture: Geotech + Excavations + Foundations: Procedures and Consultants, Geotechnical Investigation, Soil Bearing Pressure. Foundation materials: concrete, wood, and steel. Foundation types: deep foundations. Underpinning existing foundations.



Week 4 Lab: Introduce Major Case Study Assignment B

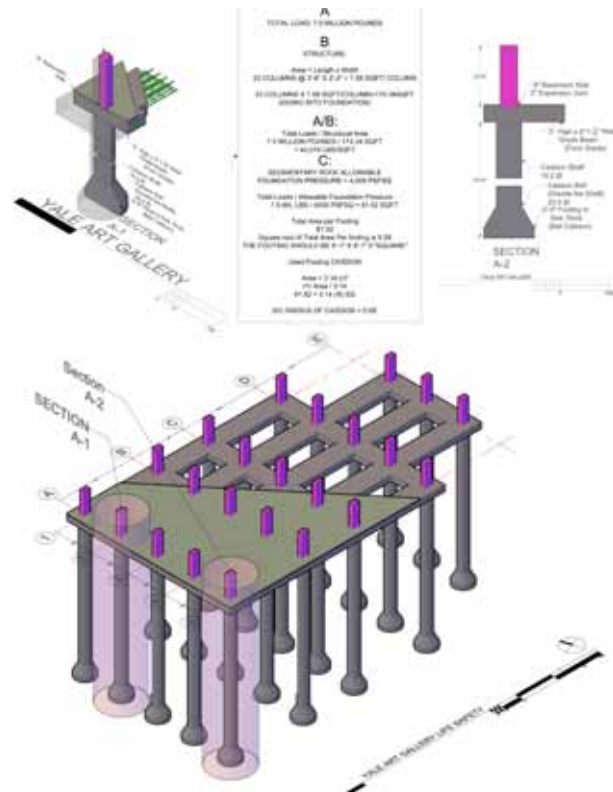
Week 4 Homework: Continue Major Case Study Assignment B

Week 4 Quiz: Allen and Iano, Chapter 14, Ching, Chapter 4

Week 4 Reading:

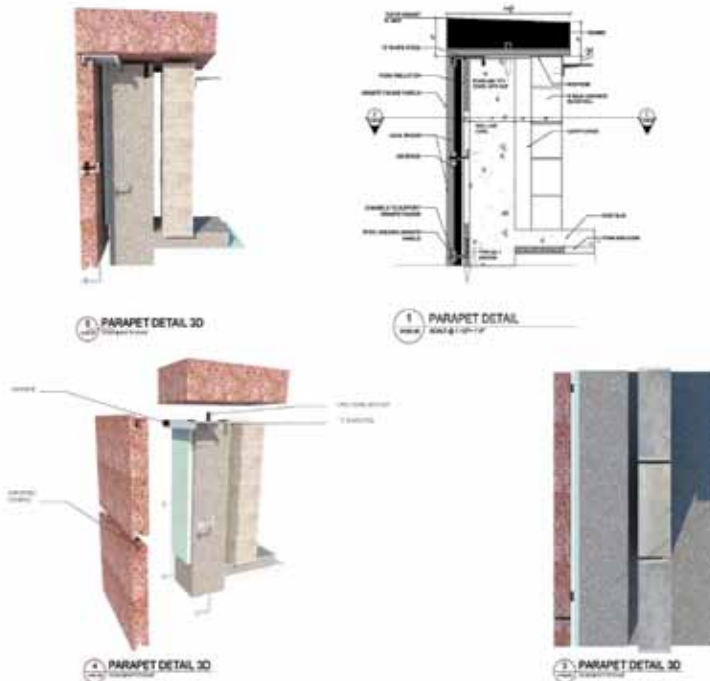
Allen and Iano, Foundations
 Chapter 2, pp. 29-38, pp. 56-71

Ching, Building Construction Illustrated,
 Chapter 3, pp. 3.02-3.26



WEEK 5:

Week 5 Lecture: Designing Exterior Wall Systems: design requirements, environmental performance, water-tightness, sealant joints, load bearing versus curtain wall.



Week 5 Lab: Pin Up: Major Case Study Assignment B

Week 5 Homework: Complete Major Case Study Assignment B

Week 5 Quiz: **Allen and Iano**, Chapter 2, **Ching**, Chapter 3

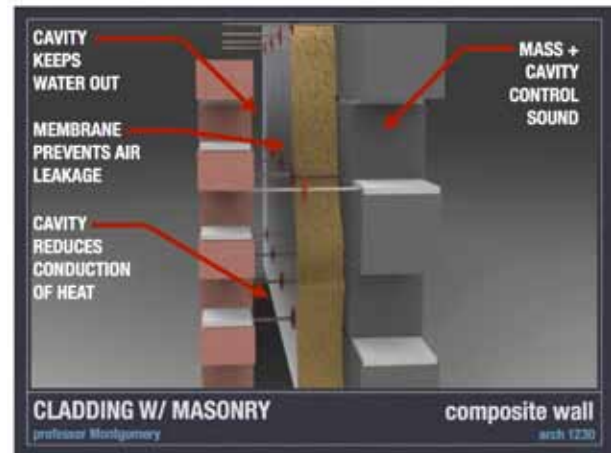
Week 5 Reading:

Allen and Iano, Designing Exterior Wall Systems Chapter 19, pp.783-807

Ching, Building Construction Illustrated, Chapter 5, pp. 5.02-5.03, Chapter 7, pp. 7.22-7.25, pp. 7.39-7.50

WEEK 6:

Week 5 Lecture: Cladding with Masonry and Concrete: masonry veneer curtain walls, stone curtain walls, pre-cast concrete curtain walls, EIFS, future directions.



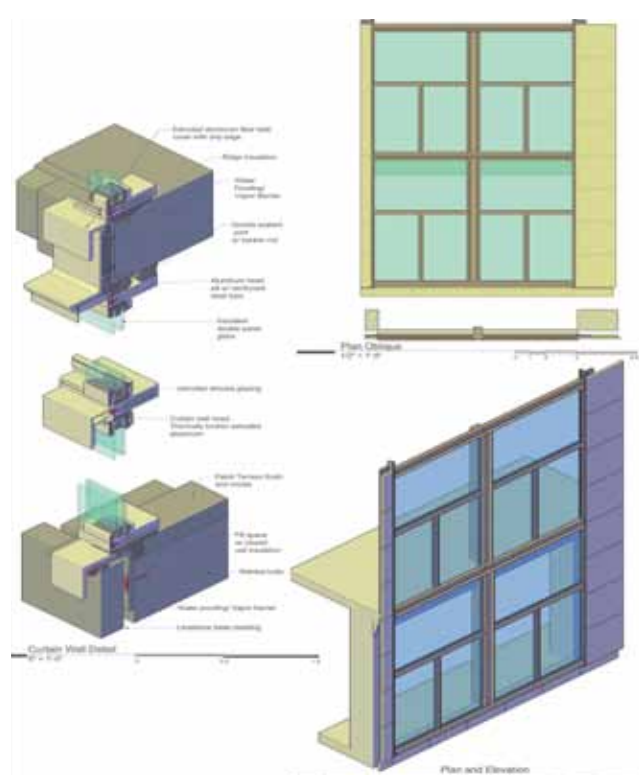
Week 6 Lab: Drawing Wall Sections, Introduce Major Case Study Assignment C

Week 6 Homework: Continue Major Case Study Assignment C

Week 6 Quiz: Allen and Iano, Chapter 19, **Ching**, Chapters 5 & 7.

Week 6 Reading: **Allen and Iano**, Cladding with Masonry and Concrete Chapter 20, pp. 809-837

Ching, Building Construction Illustrated, Chapter 7, pp. 7.26-7.31



WEEK 7:

Week 7 Lecture: Cladding with Metal and Glass: aluminum extrusions, aluminum and glass framing systems, modes of assembly, the rain screen principle, expansion joints, dual-layered glass cladding, curtain wall design process.



DETAIL AT FLOOR SLAB

Week 7 Lab: Pin Up: Major Case Study Assignment C

Week 7 Homework: Continue Major Case Study Assignment C

Week 7 Quiz: Allen and Iano, Chapter 20, **Ching,** Chapter 7.

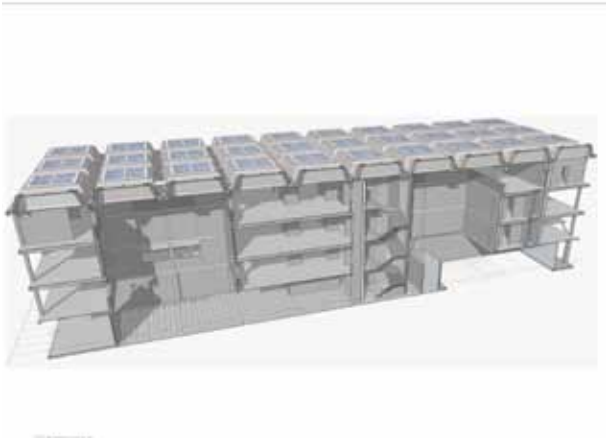
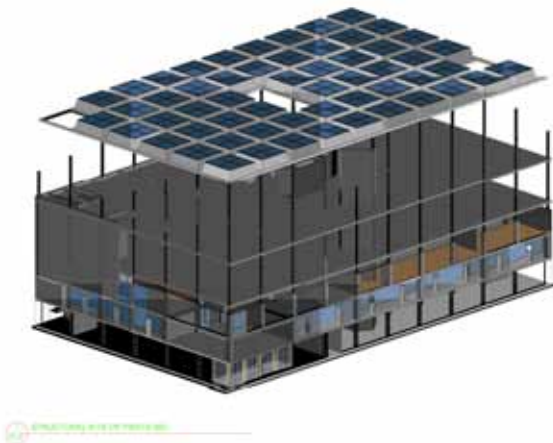
Week 7 Reading:

Allen and Iano, Cladding with Metal and Glass Chapter 21, pp. 839-867

Ching, Building Construction Illustrated, Chapter 8, pp. 8.28-8.33

WEEK 8:

Week 8 Lecture: Pin Up / Redmarks: Drawing Assignments B+C

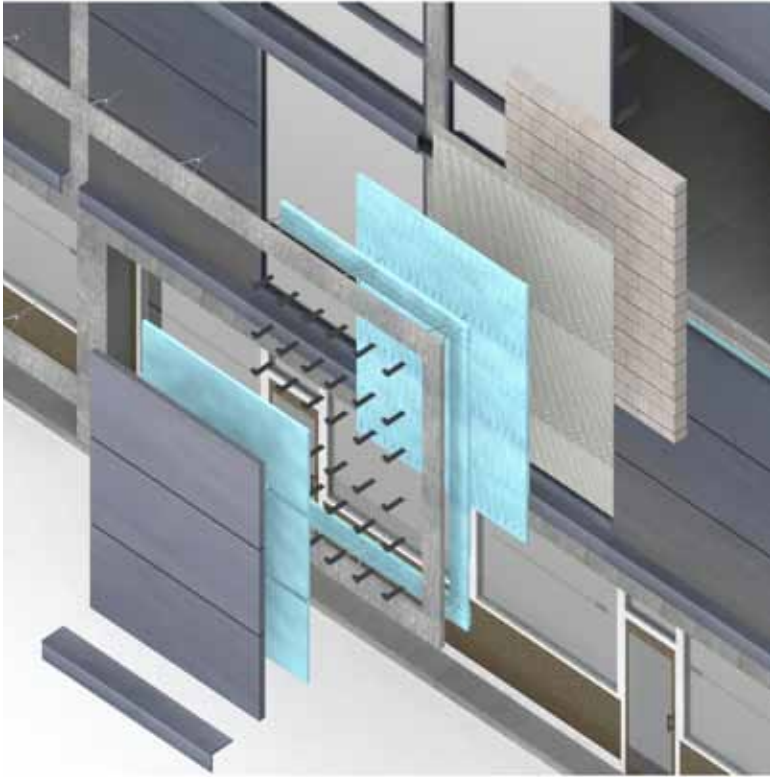


Week 8 Lab: Desk Crits: Major Case Study Assignment C

Week 8 Homework: Complete Assignment C

Week 8 Quiz: Allen and Iano, Chapter 21, Ching, Chapter 8

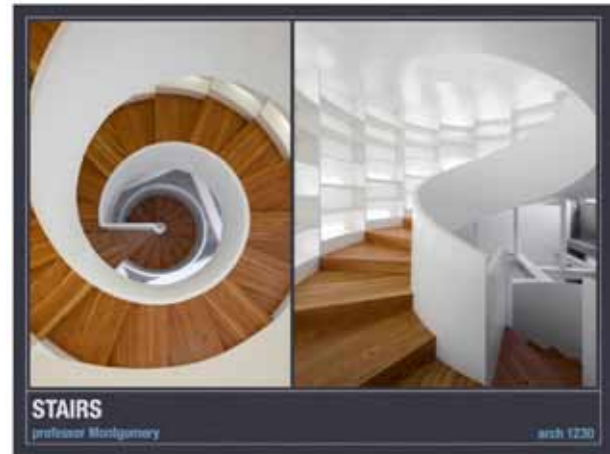
Week 8 Reading: none



WEEK 9:

Week 9 Lecture: Stairs and Elevators: Functional requirements, design and code analysis.

Introduction to Assignment D: Stair Design + Documentation



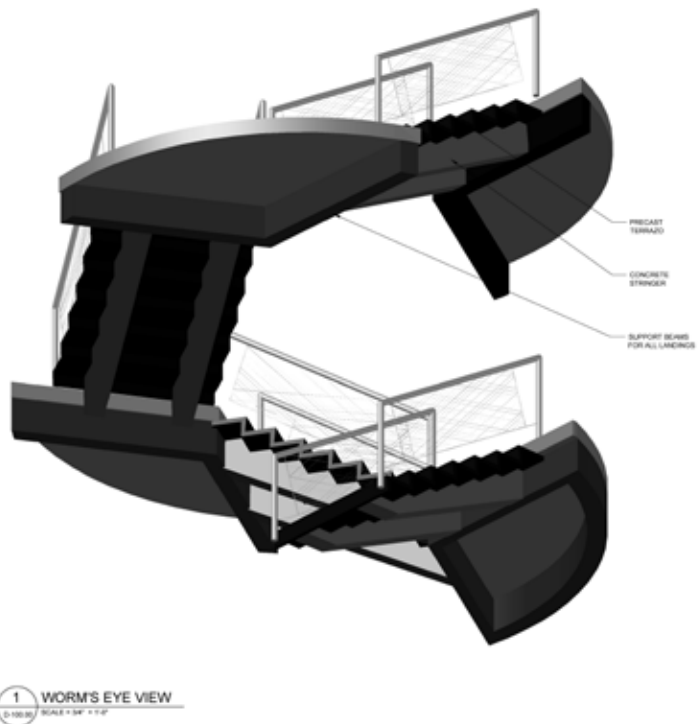
Week 9 Lab: Drawing Stairs

Week 9 Homework: Continue Major Case Study Assignment D

Week 9 Quiz: none

Week 9 Reading:

Ching, Building Construction Illustrated, Chapter 9, pp. 9.02-9.17



WEEK 10:

*Week 10 Lecture: **Building Codes:*** Introduction to IBC, IRC, occupancy groups, construction types, fire resistance ratings, allowable building height and area calculations. **Introduce** Assignment F Code Analysis/Life Safety Diagram



*Week 10 Lab: **Pin Up:*** Major Case Study Assignment D

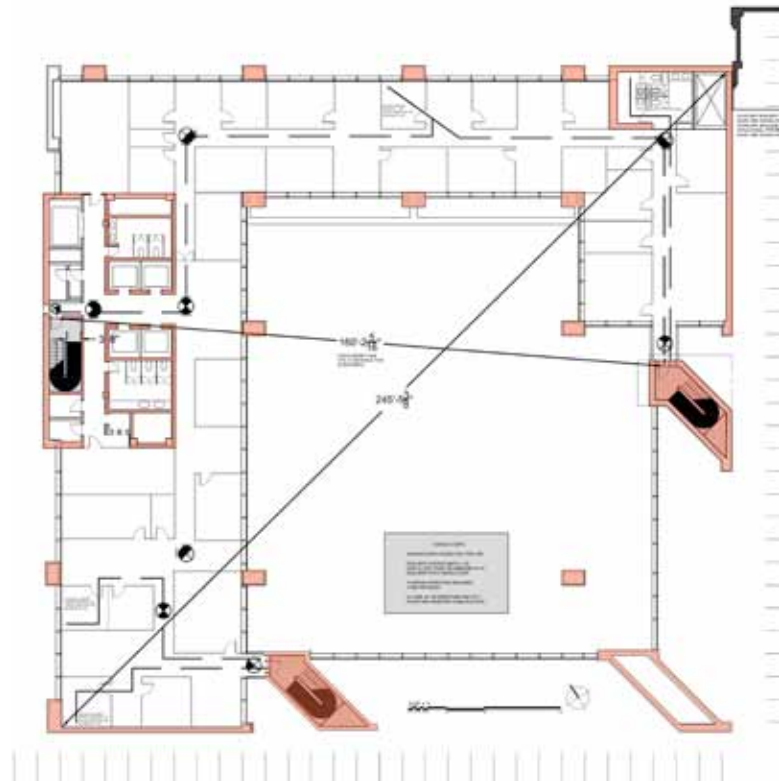
Week 10 Homework: Complete Major Case Study Assignment D

Week 10 Quiz: **Ching**, Chapter 9

Week 10 Reading:

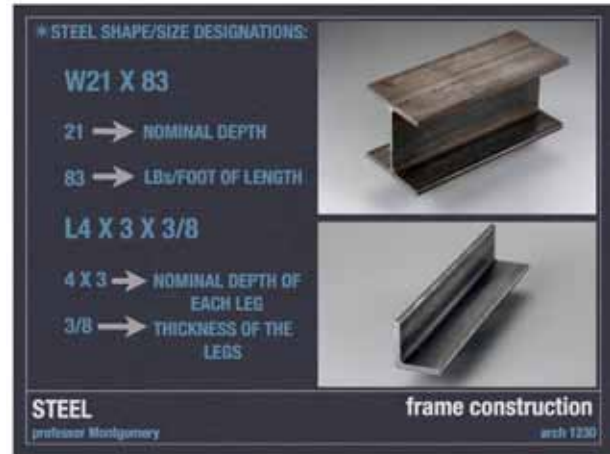
Allen and Iano, Making Buildings Chapter 1, pp. 3-27

Ching, Building Construction Illustrated, Appendix, pp. A.10-A.13



WEEK 11:

Week 11 Lecture: Steel Frame Construction Part I: History, the material steel, steel alloys, production of structural shapes.



Week 11 Lab: Introduce Major Case Study Assignment E

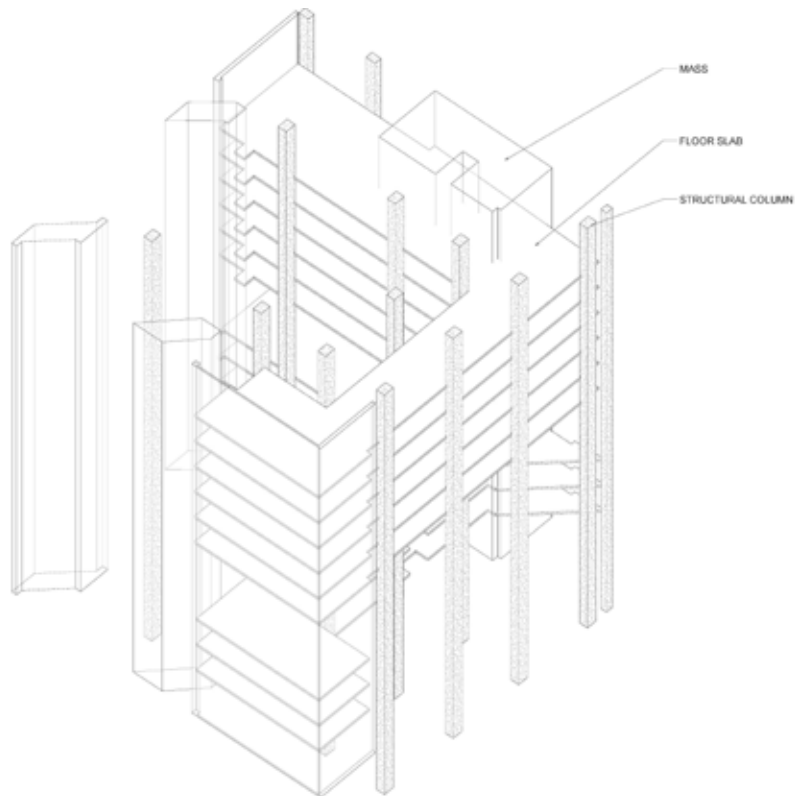
Week 11 Homework: Complete Major Case Study Assignment E

Week 11 Quiz: Allen and Iano, Chapter 1, Ching, Appendix A

Week 11 Reading:

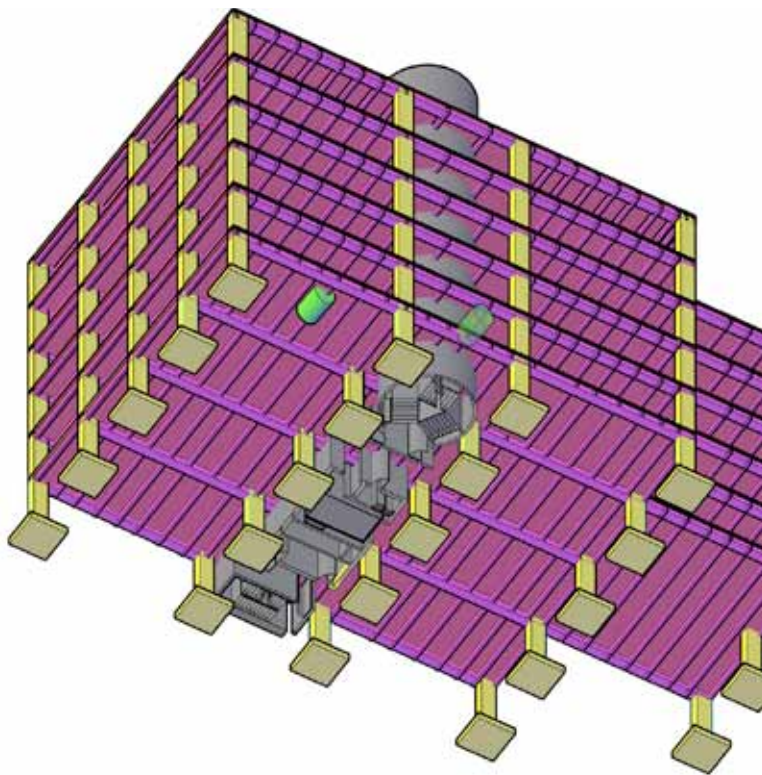
Allen and Iano, Steel Frame Construction
Chapter 11, pp. 411-440

Ching, Building Construction Illustrated,
Chapter 4, pp. 4.14-4.22



WEEK 12:

Week 12 Lecture: Steel Frame Construction Part II: Details of framing, typical connections, stabilizing the building frame, shear connections and moment connections, the construction process, the fabricator, the erector, floor and roof decking, architectural steel, fireproofing steel.



Week 12 Lab: Introduce Major Case Study Assignment F

Week 12 Homework: Continue Major Case Study Assignment F

Week 12 Quiz: Allen and Iano, Chapter 11, Ching: Chapter 4

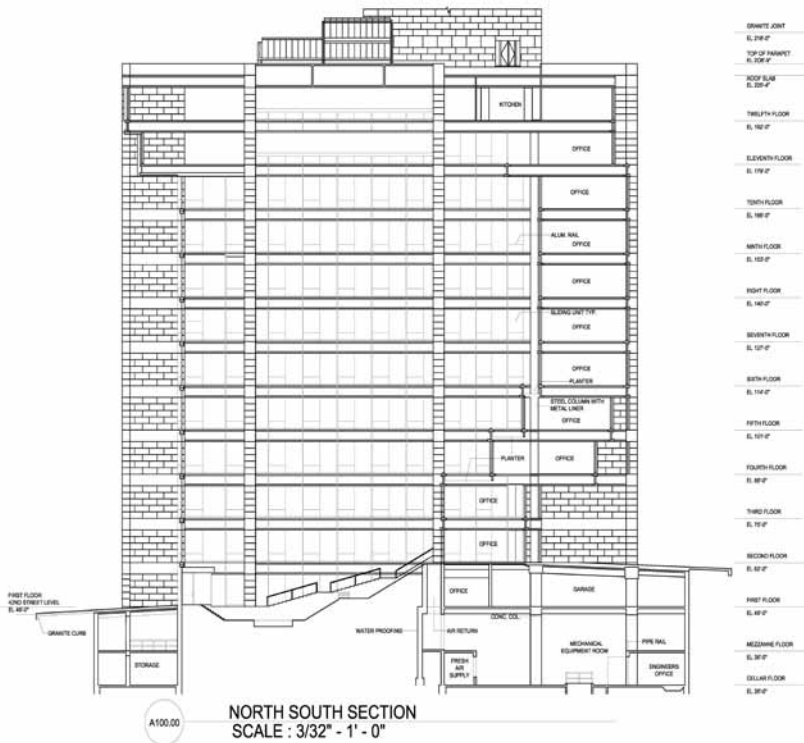
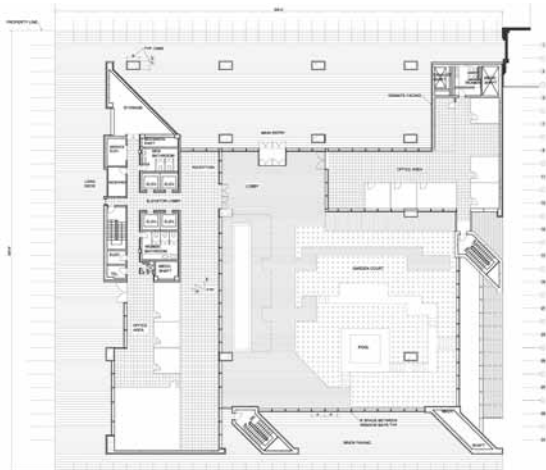
Week 12 Reading:

Allen and Iano, Steel Frame Construction Chapter 11, pp. 441-487

Ching, Building Construction Illustrated, Chapter 5, pp. 5.35-5.38, Chapter 6, pp. 6.06-6.14

WEEK13:

Week 13 Lecture: Pin Up: Major Case Study Assignments B, C, D, E, and F



- GRANITE JOINT E. 2'8" F
- TOP OF RAHWAY E. 2'0" F
- ROOF SLAB E. 2'0" F
- THIRTEENTH FLOOR E. 1'2" F
- ELEVENTH FLOOR E. 1'9" F
- TENTH FLOOR E. 1'0" F
- NINTH FLOOR E. 1'0" F
- EIGHTH FLOOR E. 1'0" F
- SEVENTH FLOOR E. 1'0" F
- SIXTH FLOOR E. 1'0" F
- FIFTH FLOOR E. 1'0" F
- FOURTH FLOOR E. 1'0" F
- THIRD FLOOR E. 1'0" F
- SECOND FLOOR E. 1'0" F
- FIRST FLOOR E. 1'0" F
- MESSENGER FLOOR E. 1'0" F
- CELLAR FLOOR E. 1'0" F

Week 13 Lab: Desk Crits: Major Case Study Assignment F

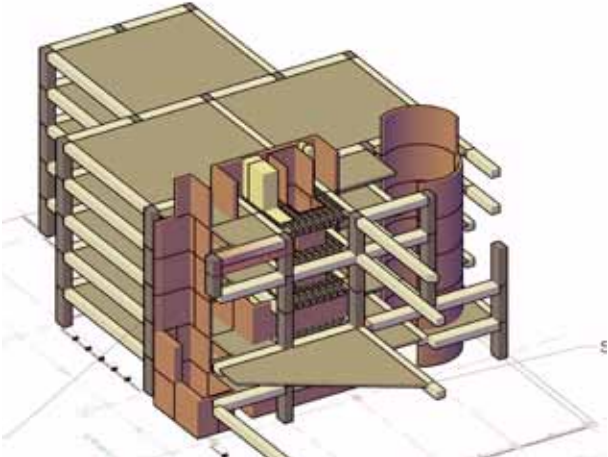
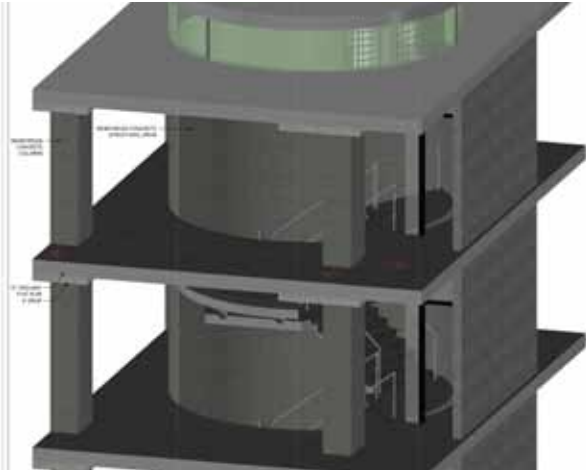
Week 13 Homework: Complete Major Case Study Assignment F

Week 13 Quiz: Allen and Iano, Chapter 11, Ching, Chapters 5, 6

Week 13 Reading: Final Exam preparation

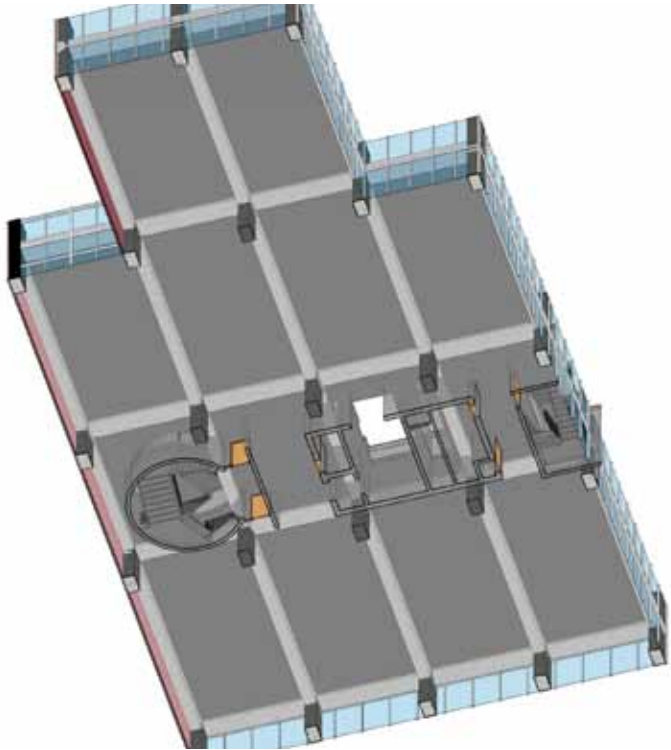
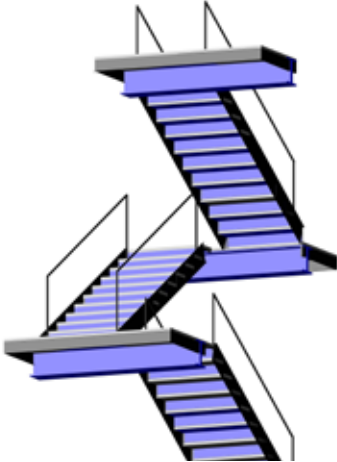
WEEK 14:

Week 14 Lecture: Introduce Major Case Study Assignment G



Week 14 Lab: Pin Up: Major Case Study Assignment G

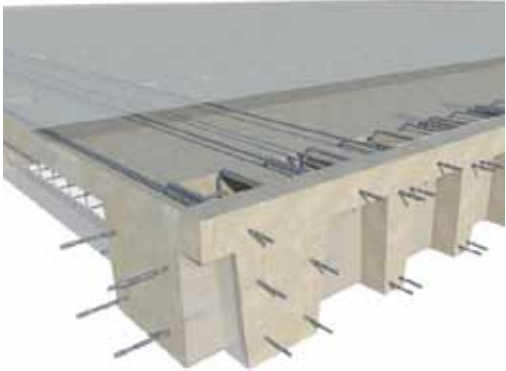
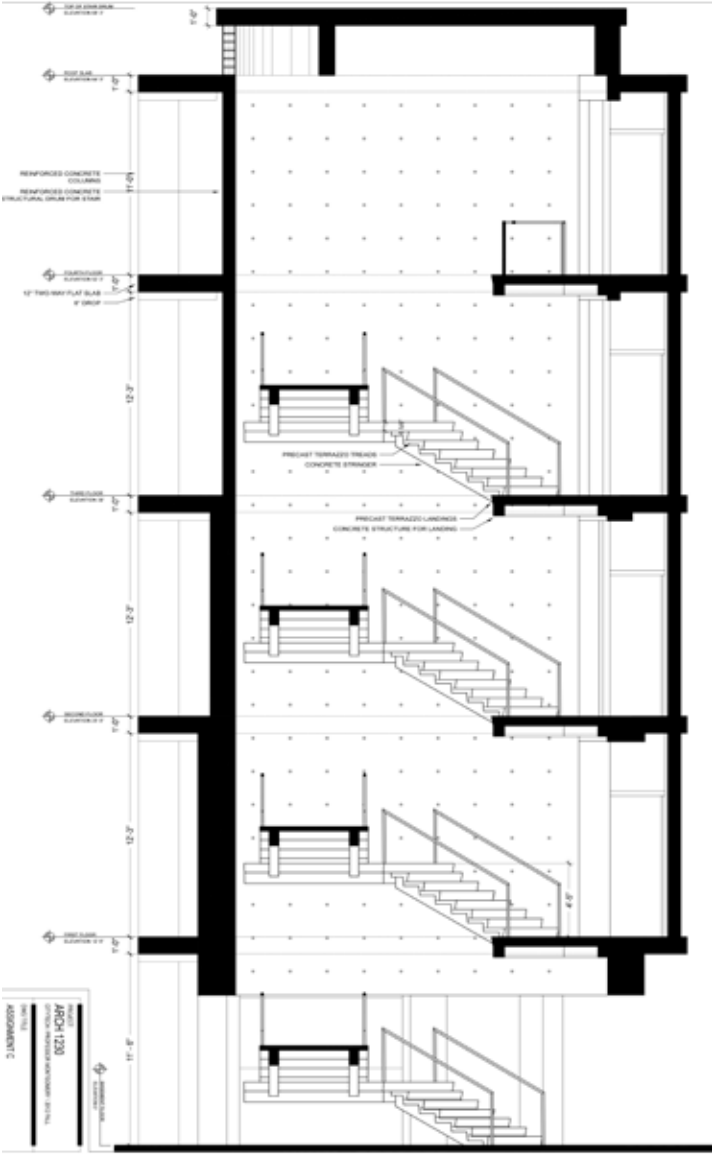
Week 14 Homework: Complete Major Case Study Assignment G



WEEK15:

Week 15 Lecture: **FINAL EXAMINATION**

Week 15 Lab: **FINAL Pin Up: All Assignments**



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