

NEW YORK CITY COLLEGE OF TECHNOLOGY

FALL 2013



**ARCH 1230 BUILDING TECHNOLOGY II
COURSE OUTLINE**

COURSE COORDINATOR - PROFESSOR JASON MONTGOMERY

DEPARTMENT OF ARCHITECTURAL TECHNOLOGY

ARCH 1230

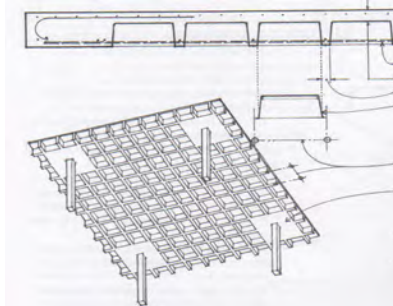
BUILDING TECHNOLOGY II

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

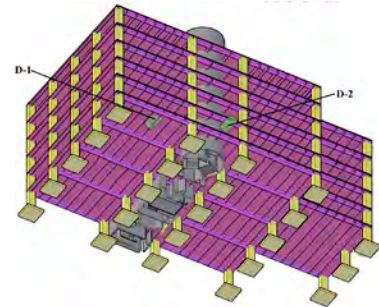
Course Description: This course will study the basic materials of construction as well as the theory and practice of building technology. The course will include investigation of the assembly of building components and methods of construction while developing proficiency in both analog and digital drawing 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.

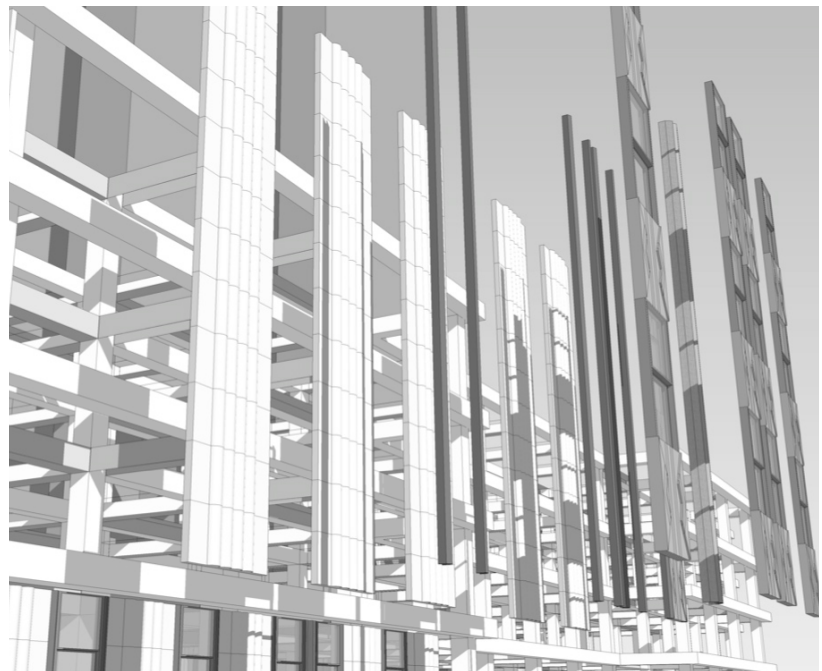
Attendance Policy: No more than 10% absences are permitted during the semester. For the purposes of record, two lateness are considered as one absence. Exceeding this limit will expose the student to failing at the discretion of the instructor.

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

- 45% Studio Lab Assignments
- 15% Quizzes
- 10% Research Assignments
- 25% Final Exam
- 5% Class Participation



LEARNING OBJECTIVES

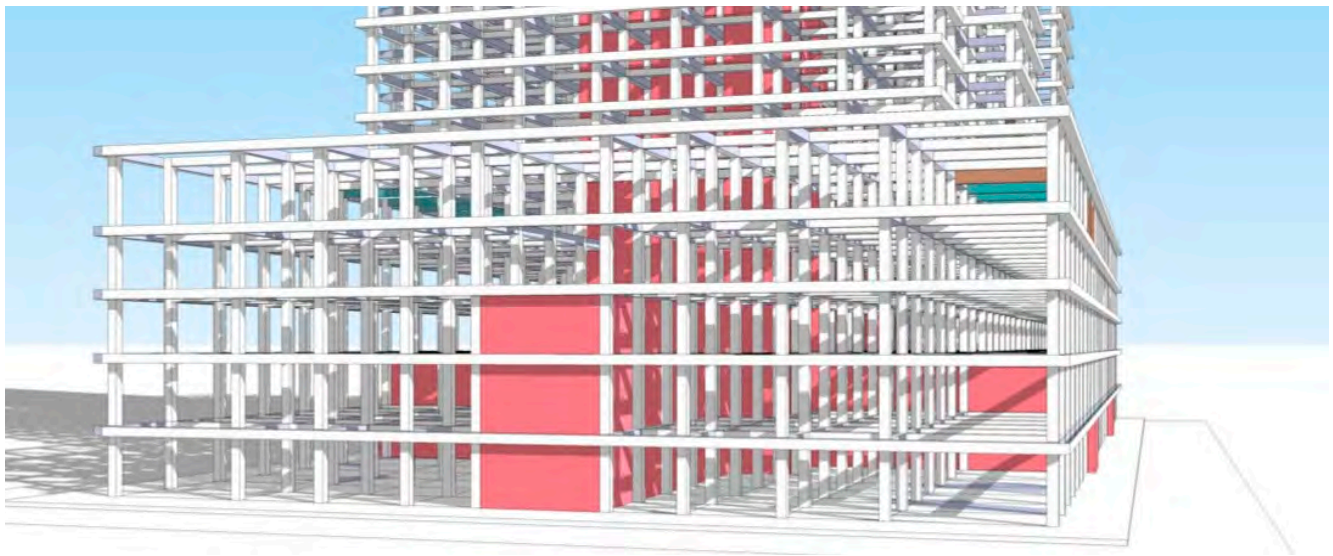
Upon successful completion of this course, the student will:

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:

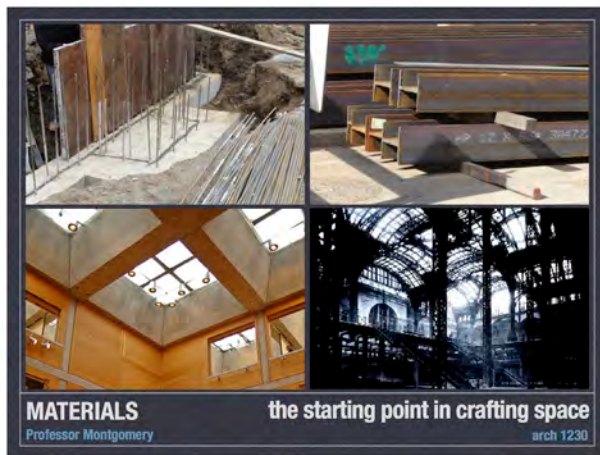
1. Review research assignment focused on the analysis of assemblies and details and the relationship of technology to tectonics, human scale, and architectural character. (Los: 1,8,13)
2. Test the students' ability to recall and recite the key terms and material of the readings and lectures through weekly 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)



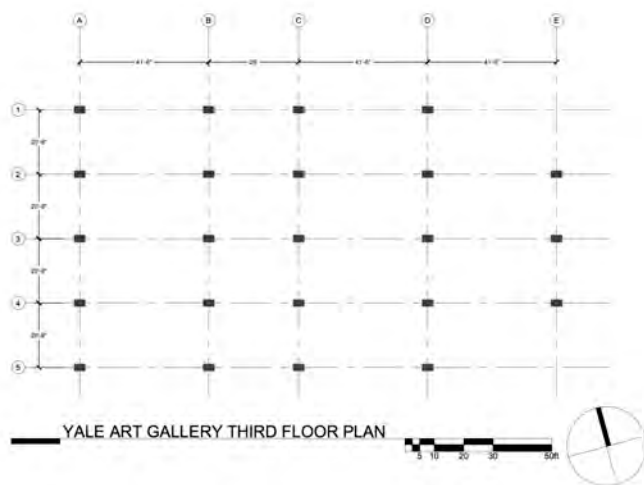
WEEK BY WEEK SUMMARY

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 + Modeling: analog and digital tools and techniques. SketchUp, AutoCAD and BIM Software: Introduction to AutoCAD Interface, Terminology, and Key Commands. **Introduction** Assignment A: Site and Grid



Week 1 Homework: Continue Assignment A Site and Grid

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: Desk Crits:
Assignment A Site and Grid

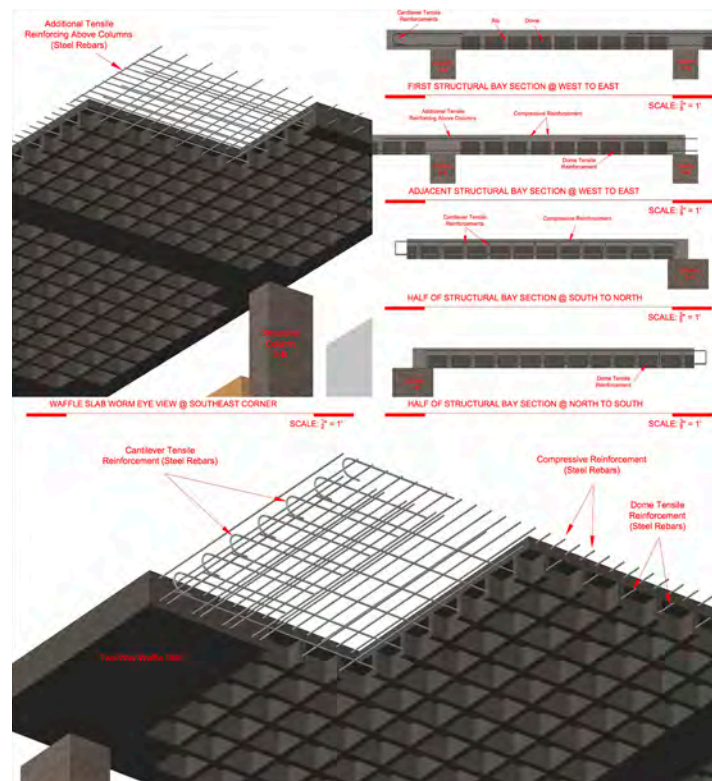
Week 2 Homework: Complete Assignment A

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

Week 2 Reading:

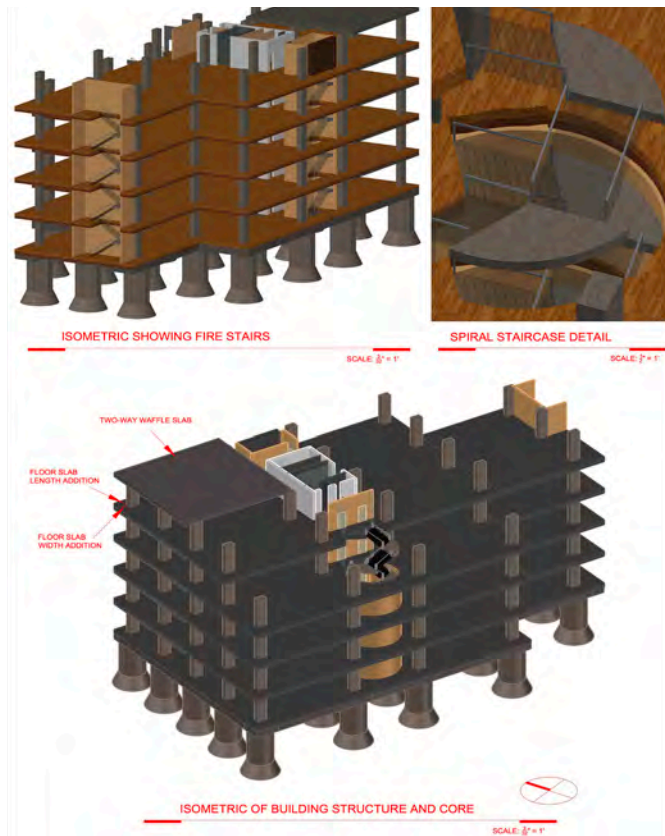
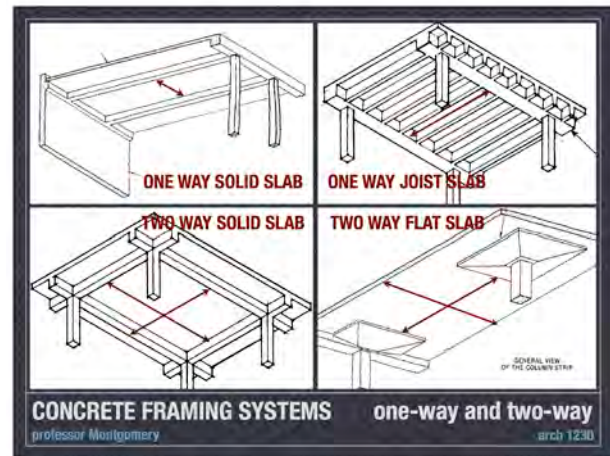
Allen and Iano, Concrete Construction
Chapter 13, pp. 515-551

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: Pin Up/Redmarks: Assignment A (complete) Introduction Assignment B Structural Frame

Week 3 Homework: Continue Assignment B

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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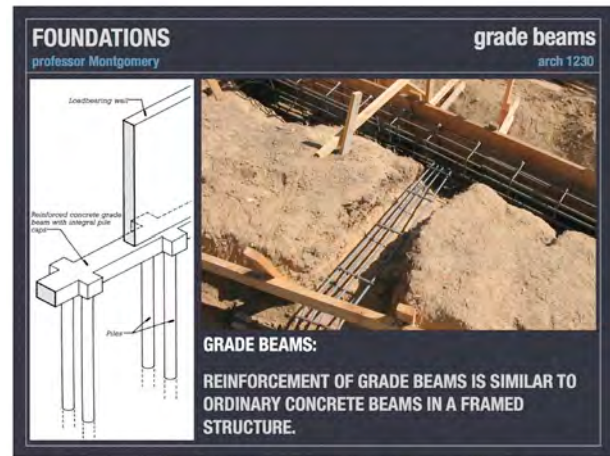
WEEK 3:

Week 3 Field Trip: Case Study Building #1 Yale University Art Gallery 1111 Chapel Street, New Haven, CT
Required weekend trip. Students to investigate YAG using sketchbooks and professional quality cameras provided by Perkins Grant funding. Also to visit Yale Center for British Art, Art and Architecture Building, Beineke Library, and Ingalls Rink.



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: Desk Crits:
 Assignment B Progress: Structural Frame + Foundation Calcs

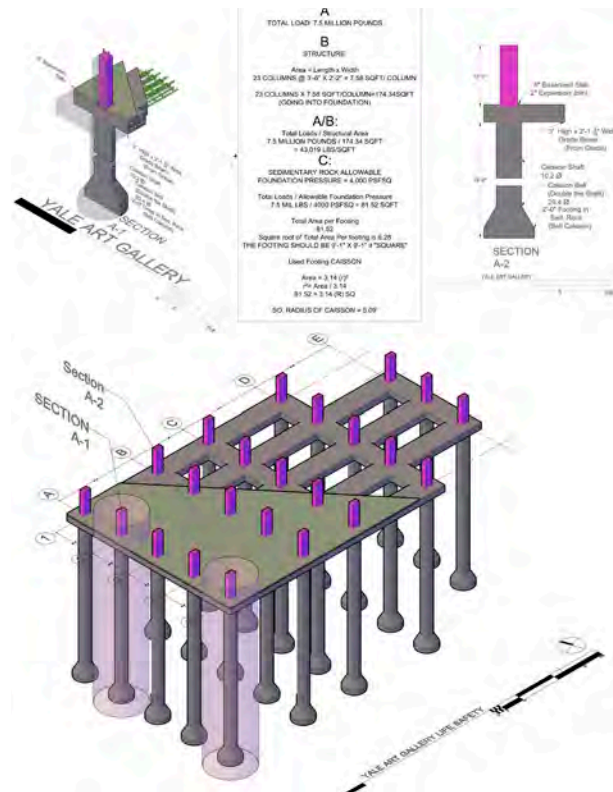
Week 4 Homework: Continue Assignment B, Structural Frame + Foundation Calculations + Design

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

Week 4 Reading:

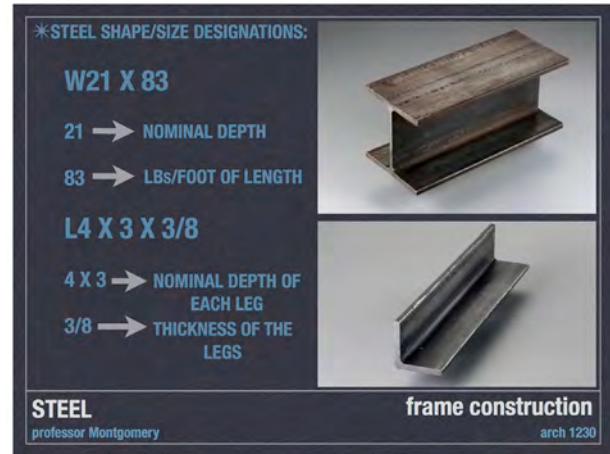
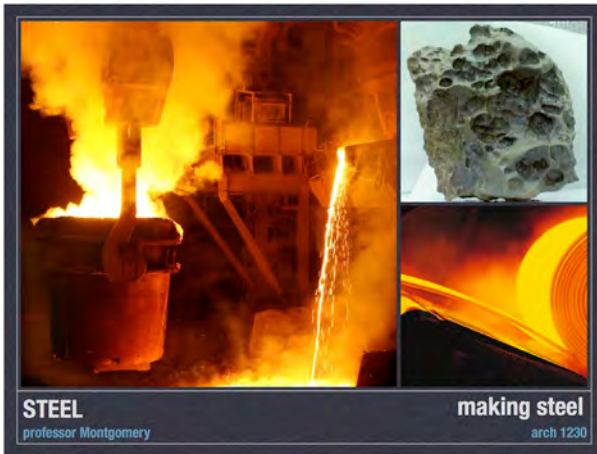
Allen and Iano, Foundations
 Chapter 2, pp. 29-38, pp. 56-71

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



WEEK 5:

Week 5 Lecture: Steel Frame Construction Part I: History, the material steel, steel alloys, production of structural shapes.



Week 5 Lab: Field Trip: Case Study Building #2

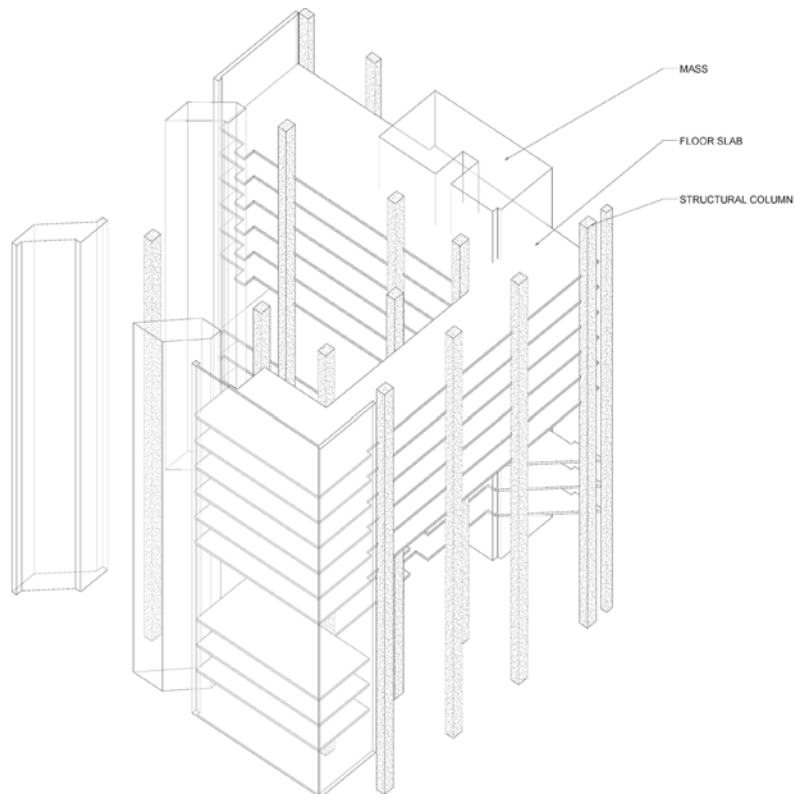
Week 5 Homework: Continue Assignment B

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

Week 5 Reading:

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

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



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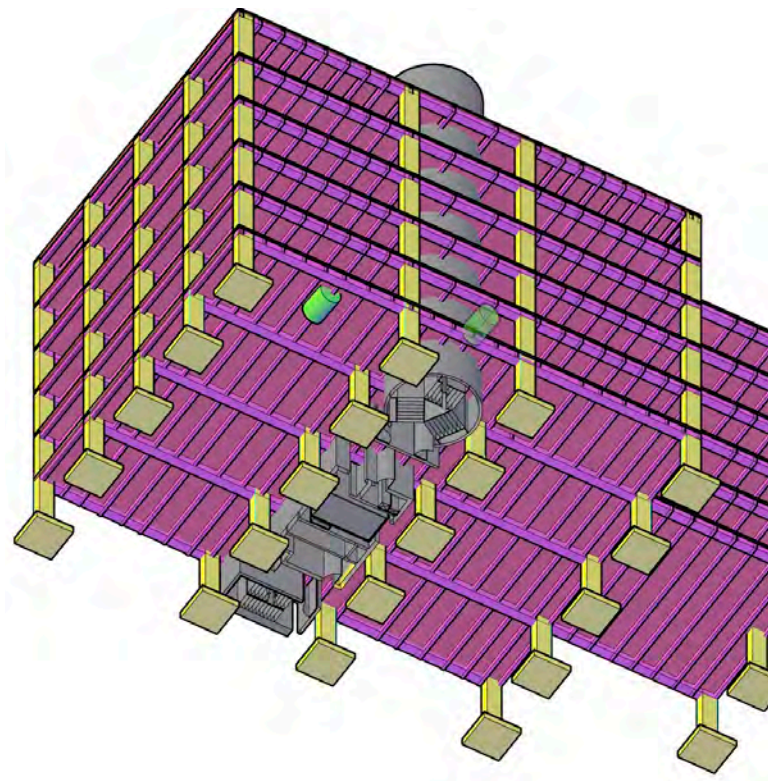
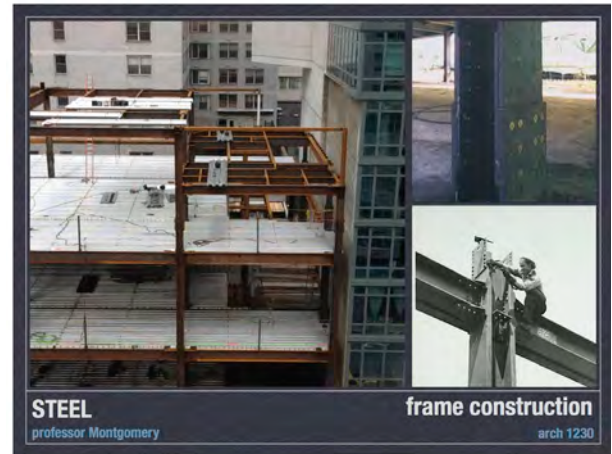
WEEK 5:

Week 5 Field Trip: Case Study Building #2 Ford Foundation 320 E. 43rd Street, New York, NY
In class field trip. Students to investigate FF using sketchbooks and professional quality cameras providing by Perkins funding.



WEEK 6:

Week 6 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 6 Lab: Pin Up/Redmarks:
Assignment B Progress

Week 6 Homework: Complete Assignment B

Week 6 Quiz: Allen and Iano, Chapter 11,
Ching: Chapter 4

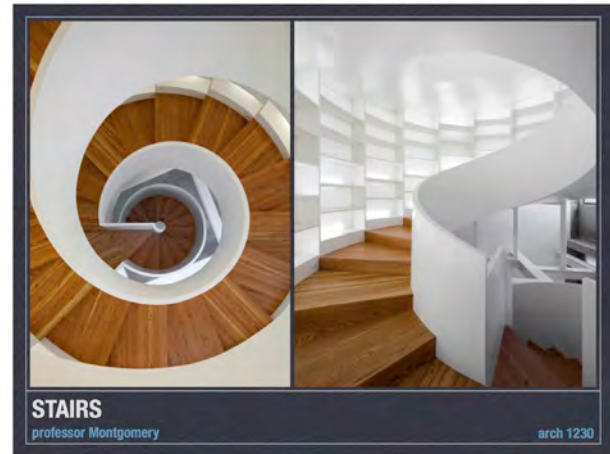
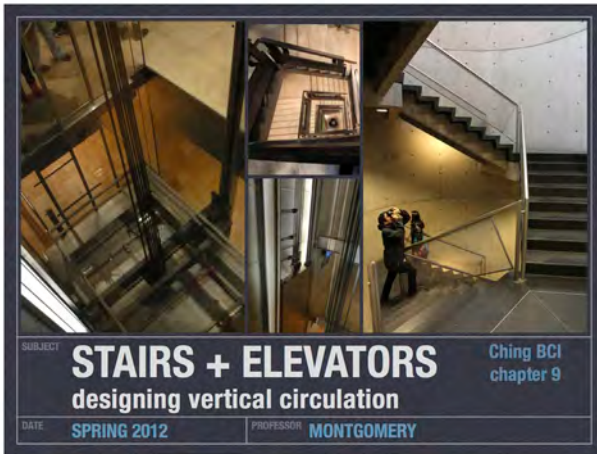
Week 6 Reading:

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

WEEK 7:

Week 7 Lecture: Stairs and Elevators: Functional requirements, design and code analysis.
Introduction to Assignment C: Stair Design + Documentation



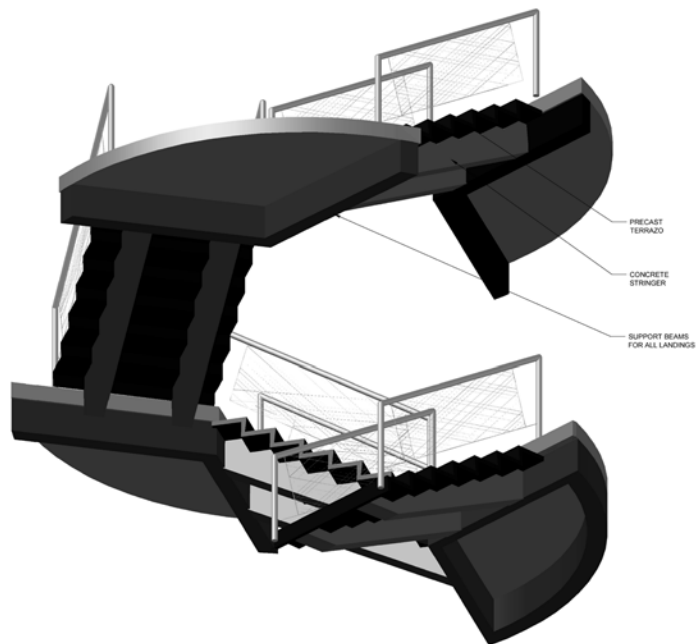
Week 7 Lab: Pin Up/Remarks: Review Assignment C Stair Calcs

Week 7 Homework: Continue Assignment C Stair Calcs, Design + Documentation

Week 7 Quiz: Allen and Iano, Chapter 11, **Ching**, Chapters 5 & 6

Week 7 Reading:

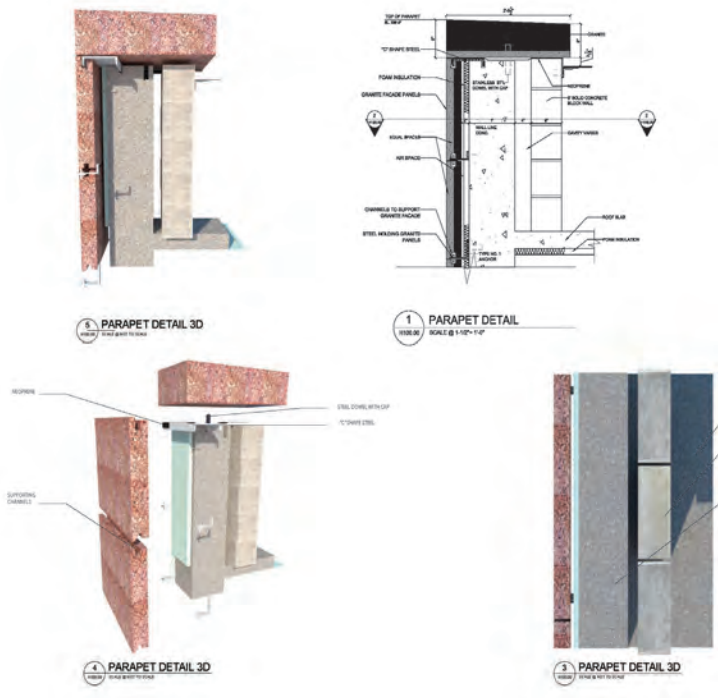
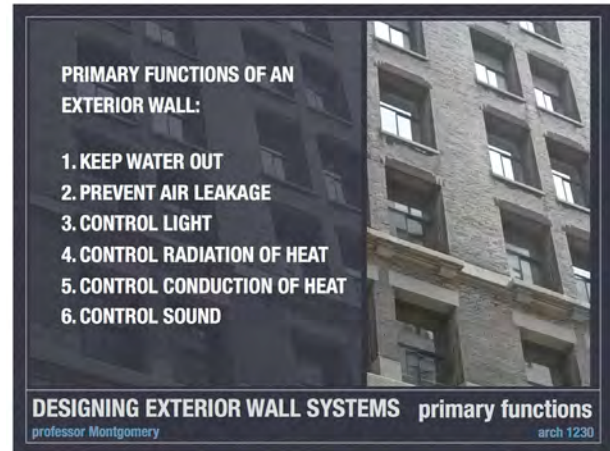
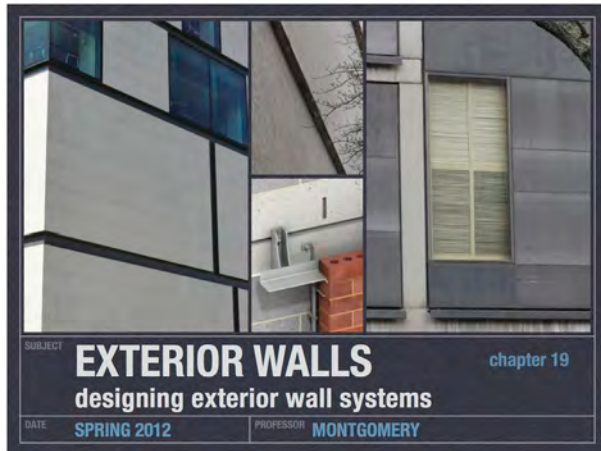
Ching, Building Construction Illustrated, Chapter 9, pp. 9.02-9.17



1 WORM'S EYE VIEW
D-102/00 SCALE = 3/4" = 1'-0"

WEEK 8:

Week 8 Lecture: Designing Exterior Wall Systems: design requirements, environmental performance, water-tightness, sealant joints, load bearing versus curtain wall.



Week 8 Lab: Desk Crits: Assignment C Stair Calcs, Design + Documentation

Week 8 Homework: Complete Assignment C

Week 8 Quiz: Ching, Chapter 9

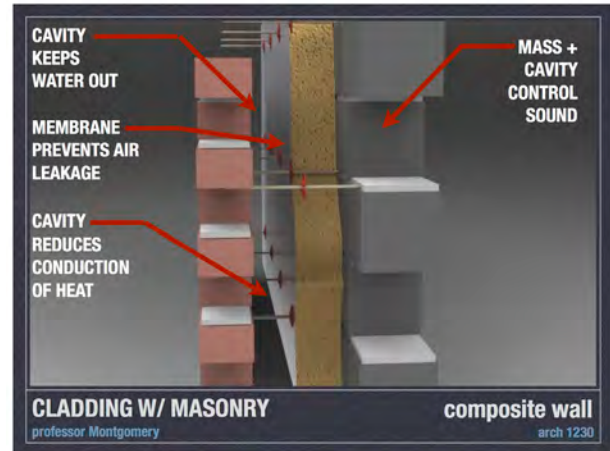
Week 8 Reading:

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 9:

Week 9 Lecture: Cladding with Masonry and Concrete: masonry veneer curtain walls, stone curtain walls, pre-cast concrete curtain walls, EIFS, future directions. **Introduce** Assignment D Exterior Skin.



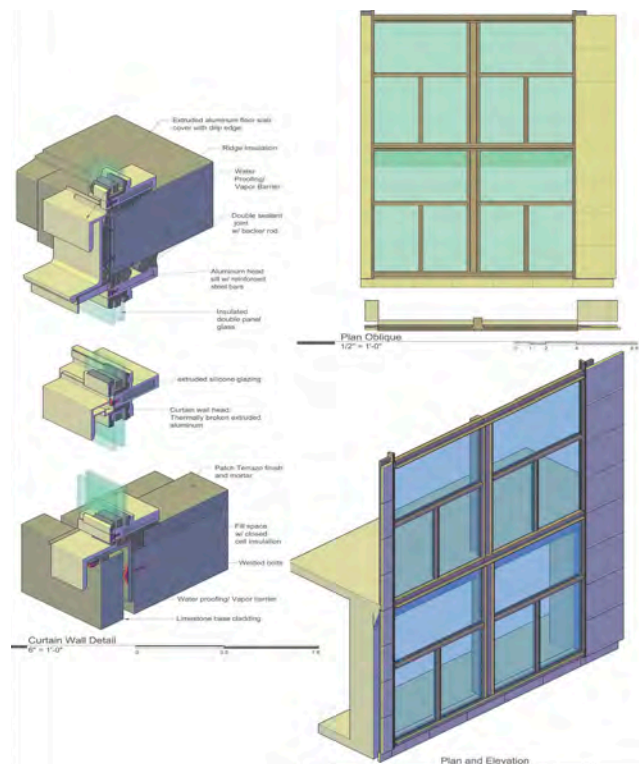
Week 9 Lab: Pin Up/Redmarks: Assignment C (complete) **Desk Crits:** Assignment D Exterior Skin

Week 9 Homework: Continue Assignment D

Week 9 Quiz: Allen and Iano, Chapter 19, **Ching,** Chapters 5 & 7.

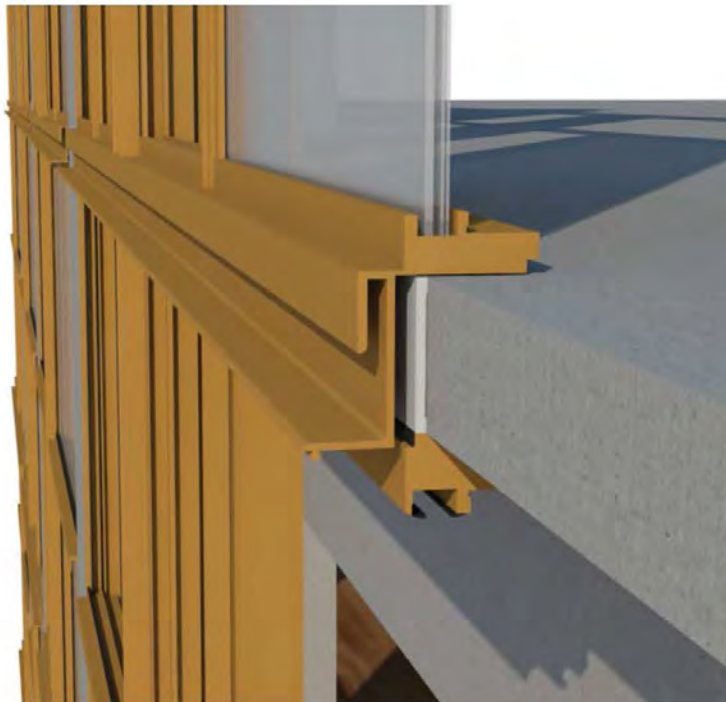
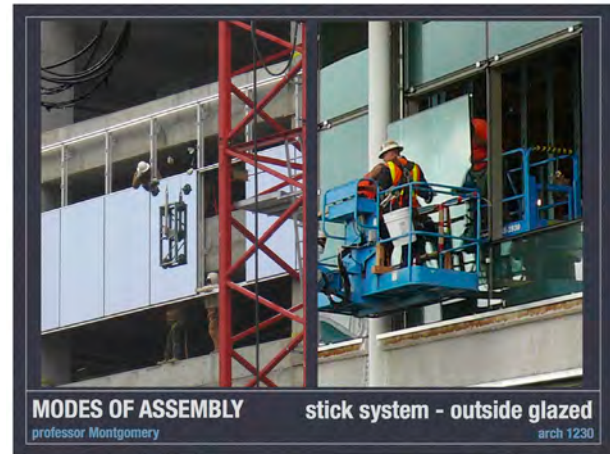
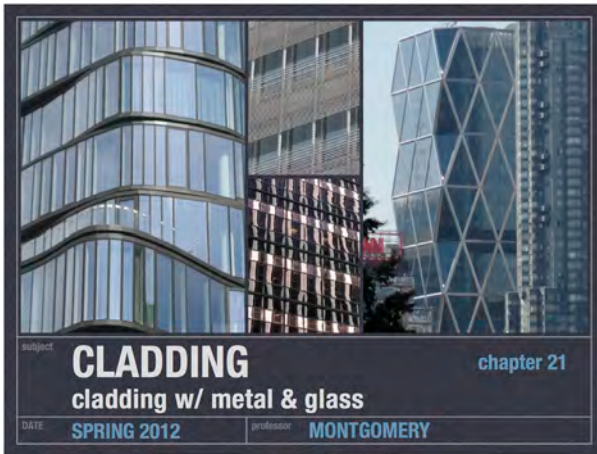
Week 9 Reading:
Allen and Iano, Cladding with Masonry and Concrete Chapter 20, pp. 809-837

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



WEEK 10:

Week 10 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 10 Lab: Desk Crits: Assignment D Progress

Week 10 Homework: Complete Assignment D

Week 10 Quiz: **Allen and Iano**, Chapter 20, **Ching**, Chapter 7.

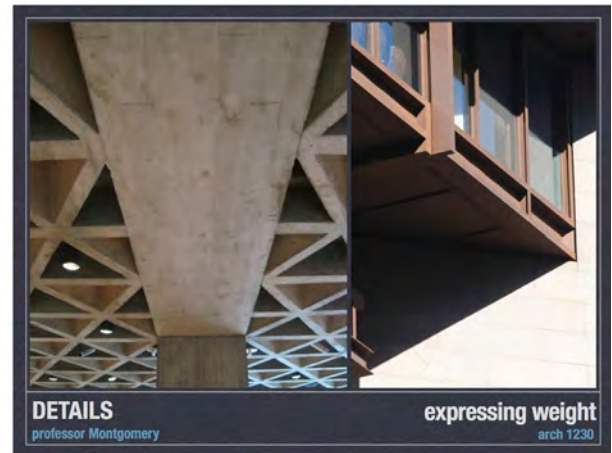
Week 10 Reading:

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 11:

Week 11 Lecture: Research Assignment Discussion

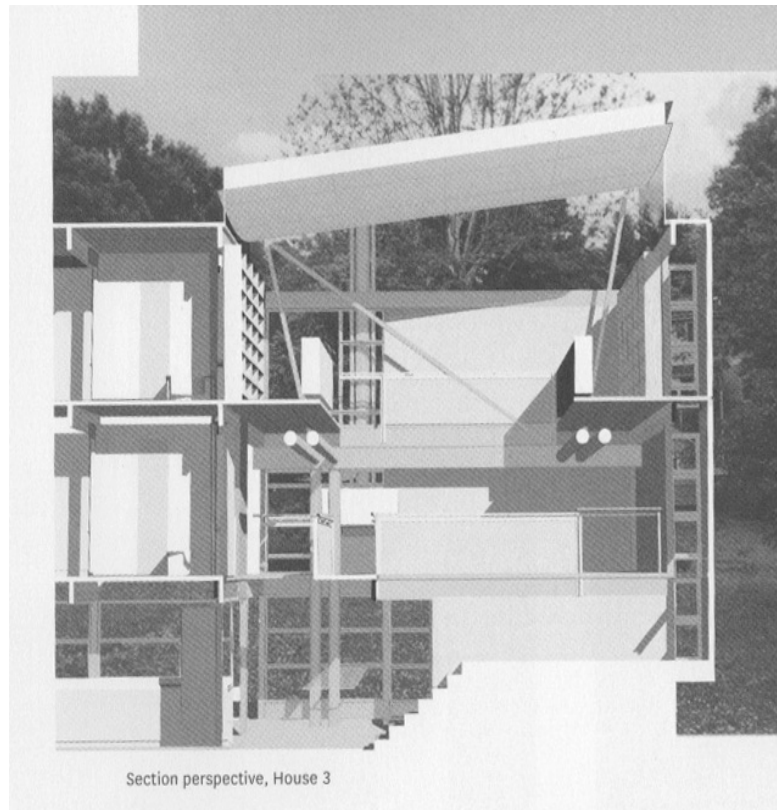


Week 11 Lab: **Introduce** Assignment E
Floor Plans

Week 11 Homework: Complete Assignment
D

Week 11 Quiz: **Allen and Iano**, Chapter 21,
Ching, Chapter 8

Week 11 Reading: Research Assignment
Reading



WEEK 12:

*Week 12 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 12 Lab: Pin Up/Redmarks: Assignment E Floor Plans

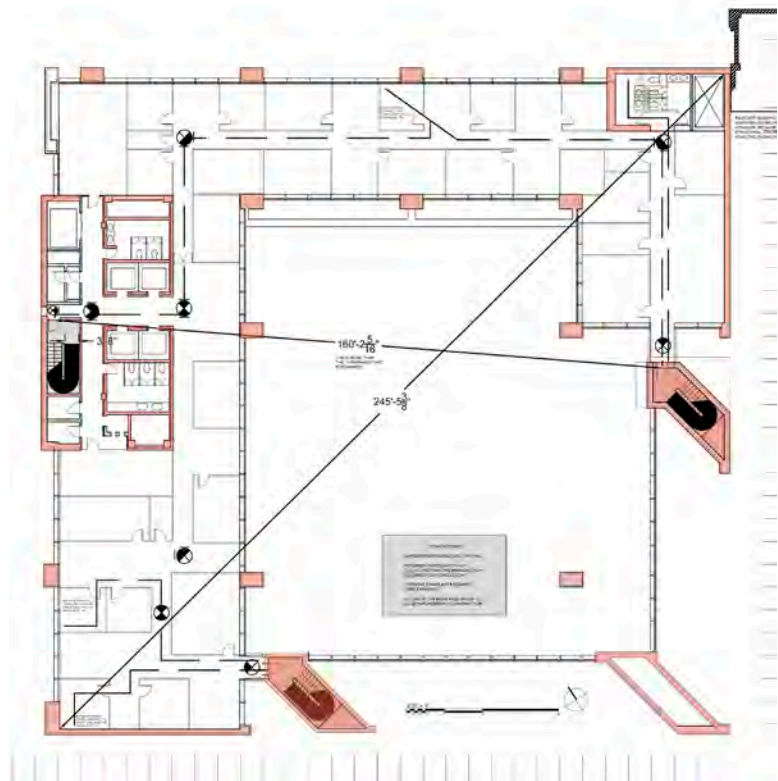
Week 12 Homework: Complete Assignment E

Week 12 Quiz: Research Assignment Vocabulary

Week 12 Reading:

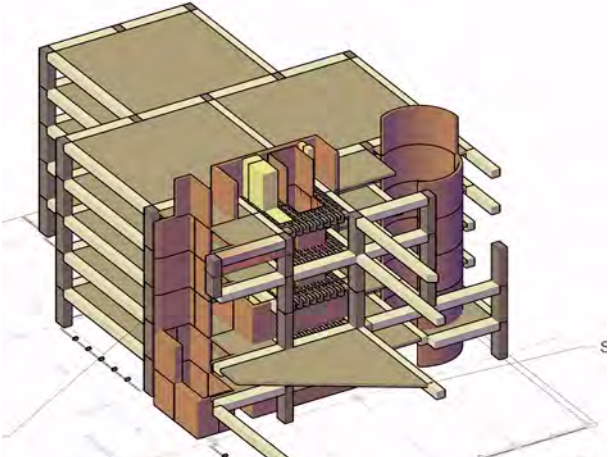
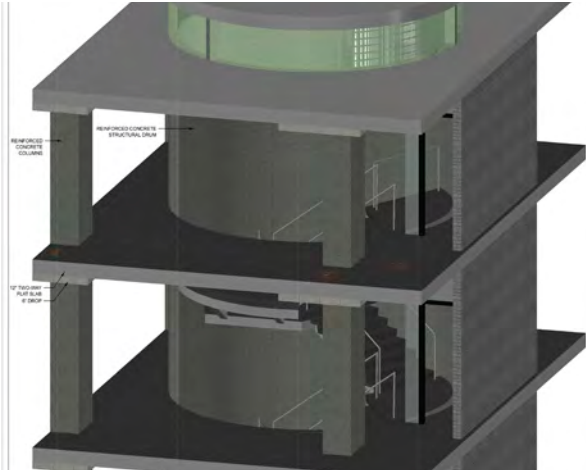
Allen and Iano, Making Buildings Chapter 1, pp. 3-27

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



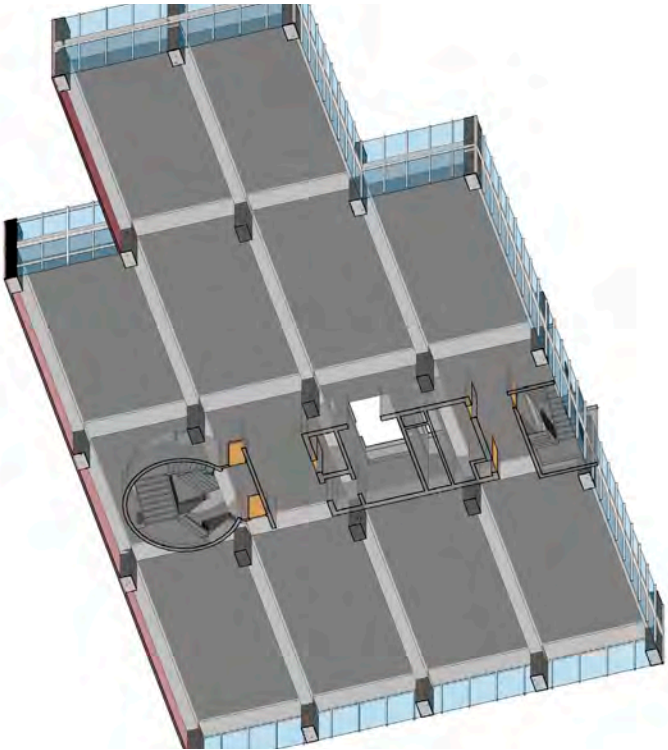
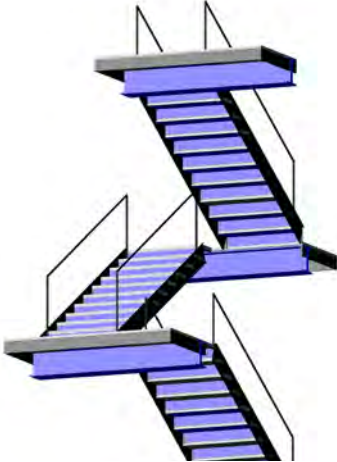
WEEK 14:

Week 14 Lecture: Final Pin Up/Redmarks Assignments A-D



Week 14 Lab: Final Pin Up/Redmarks Assignments E-F

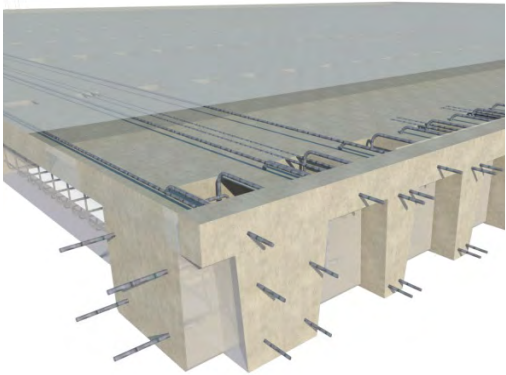
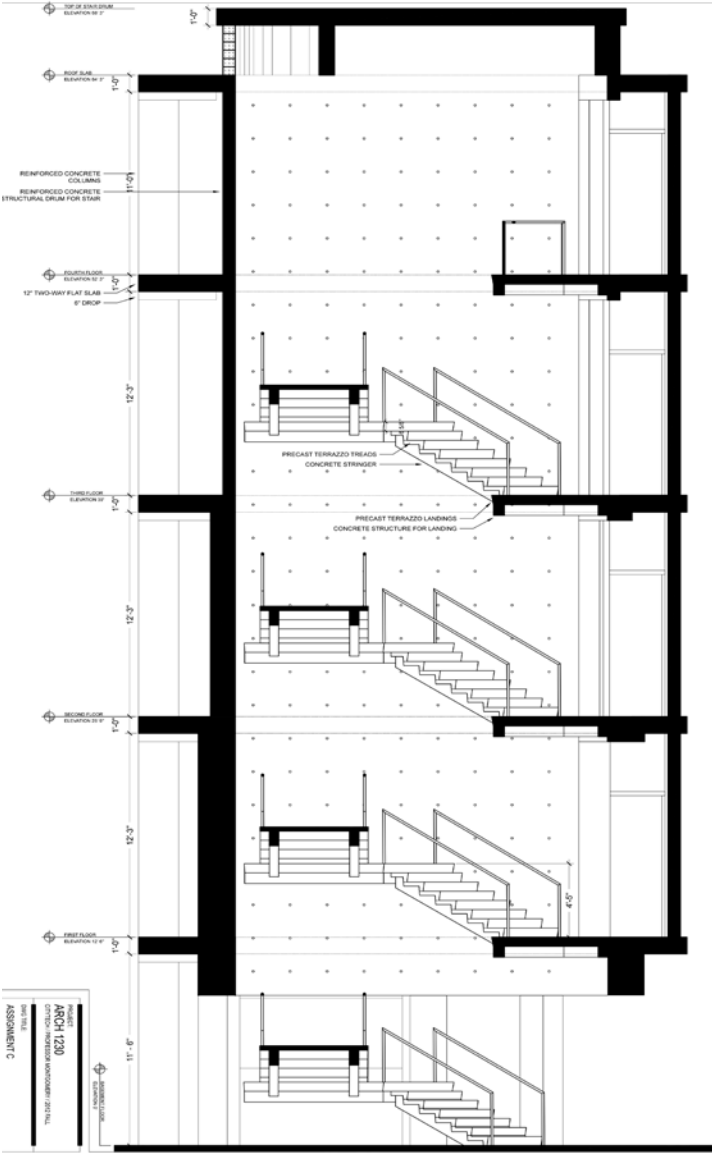
Week 14 Homework: Complete Research Assignment / Prepare for Final Exam



WEEK15:

Week 15 Lecture: **FORMAL PRESENTATION: RESEARCH ASSIGNMENT**

Week 15 Lab: **FINAL EXAMINATION**



5 PARAPET DETAIL 3D
1/8"=1'-0" SCALE @ NOT TO SCALE