

**ARCH 1231 BUILDING TECHNOLOGY I**  
1 lecture hour and 4 lab/studio hours, 3 credits

**Course Description:** An introduction to basic materials of construction and the fundamental principals of hand drafting and system analysis. The coursework includes surveying existing conditions, development of plans, elevations, and sections, and basic details as well as the study of material properties and applications.

**Course context:** This course is positioned between the Intro to Architecture course and the higher-level building technology courses. This course will prepare you for further exploration of building technology, technical documentation, and understanding of structure, materials, and building assemblies.

**Prerequisites:** ARCH 1101 Introduction to Architecture

**Required Texts:**

Allen, Edward. *Fundamentals of Building Construction: Materials and Methods*, John Wiley & Sons, 2014.  
Ching, Francis. *Building Construction Illustrated 5<sup>th</sup> Ed.* John Wiley and Sons, 2014.

**Recommended Text:**

Ching, Francis. *Architecture-Form, Space, & Order.* John Wiley and Sons, 2007.

**Suggested Reference:** See the City Tech Openlab for additional reference materials.

**Attendance Policy:** No more than 10% absences are permitted during the semester. For purposes of record, two late arrivals are considered as one absence. Exceeding this limit will expose the student to grade penalties at the discretion of the instructor due to lack of class participation and mastery of class material.

**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.

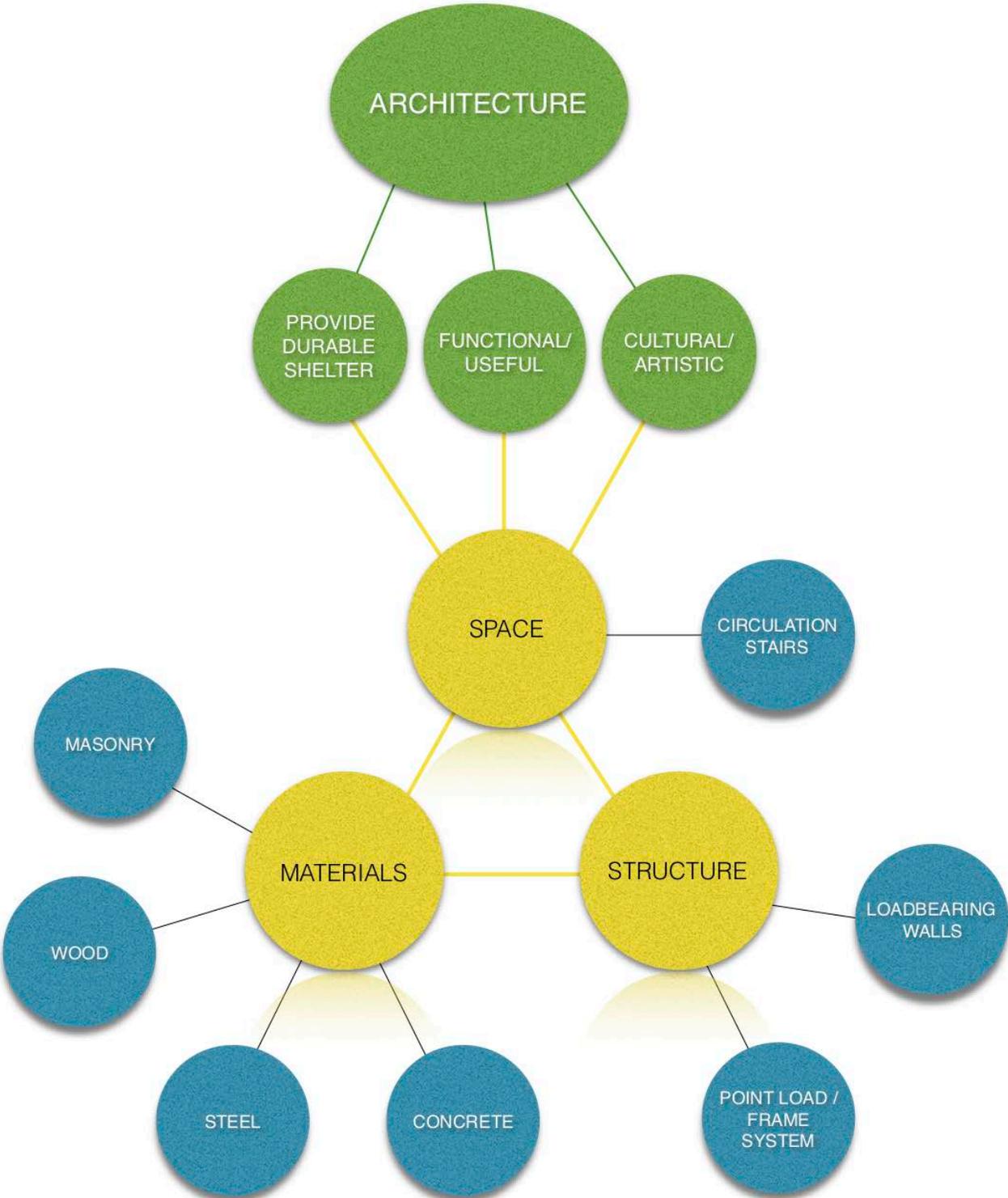
**Course Structure:** This course combines class discussions based on the readings, site investigations, and drawing labs. Students are required to maintain a combined notebook/sketchbook for all readings and site investigations. Students will learn to develop architectural drawings by hand.

**Contact Info:**

Professor: Michael Loo, AIA  
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**Grading:** 30% Module 1  
40% Module 2  
25% Module 3  
5% Participation + Class Reflections

# CONCEPT MAP FOR ARCH 1231 COURSE CONTENT



**MODULE 1:** 300 pts

**Drawing Assignments:**

Plan, Section, Elev **204**

**Reading Notes: 64**

**Sketchbook Assignments: 32**

**MODULE 2:** 400pts

**Drawing Assignment:**

Plan, Wall Section, Axon **264**

**Reading Notes: 120**

**Sketchbook Assignments: 16**

**MODULE 3:** 252pts

**Drawing Assignments:**

Axon + Unit Sections **120**

**Reading Notes: 100**

**Sketchbook Assignments: 32**

**CLASS PARTICIPATION** 48 pts

**Discussions/Reflections 40**

**Assessment Exercises: 8**

Grading Details: see course grade sheet for specific points for each required element.

**Class Submission Requirements/Protocols:**

All files must be submitted via Dropbox with the following folder directory and file naming conventions. All images must be formatted using Adobe Illustrator per provided templates. All work must be scanned or photographed following professional standards and edited as required for clarity and resolution

**Course Folder: ARCH 1231\_2020\_01\_Lastname\_Firstname**

Sub Folders: 2020\_01\_Module 1\_Lastname  
2020\_01\_Module 2\_Lastname  
2020\_01\_Module 3\_Lastname

**Files:** All submissions must be in PDF format (not jpeg). All files (drawings, reading notes, sketch assignments) must be named as follows:

**Lastname\_Firstname\_ARCH1231\_2020021\_ProfessorLastName\_Module#\_assignment title\_YYYYMMDD.pdf**

For example:

Skywalker\_Luke\_ARCH1231\_201902\_Montgomery\_Module1\_firstfloorplan\_20190925.pdf

Organa\_Lea\_ARCH1231\_201902\_Montgomery\_Module3\_reading6\_masonry wall const\_20191126.pdf

Reading Notes MUST be submitted as a single PDF multipage file for each reading topic in required list.

Any submission not conforming to the above standards will NOT be accepted and must be resubmitted.

LATE ASSIGNMENTS: Submissions not submitted on the due date will receive a 5% deduction for each day late. Submissions will not be accepted more than 1 week late.

General Education Learning Outcomes / Assessment Methods	
Learning Outcomes	Assessment Methods
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
1. Develop <b>Knowledge</b> from the range of architectural disciplinary concepts presented in the course.	<ul style="list-style-type: none"> <li>• <b>Review</b> student notebooks, <b>observe</b> student participation in class discussions, <b>and review</b> student applications of disciplinary concepts in drawing assignments.</li> </ul>
2. Use the texts assigned in the course as well as background knowledge from within the discipline in order to <b>Draw Inferences</b> from the material.	<ul style="list-style-type: none"> <li>• Use a pre and post written exam to assess students' development and achievement over the course of the semester.</li> </ul>
3. <b>Apply Information</b> from the reading within the discipline.	<ul style="list-style-type: none"> <li>• <b>Review</b> student applications of disciplinary concepts in drawing assignments.</li> </ul>

National Architectural Accrediting Board (NAAB) Students Performance Criteria (SPC) / Assessment Methods	
Learning Outcomes	Assessment Methods
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
<b>4. Understand</b> the fundamentals of formal ordering systems and the capacity to inform two- and three-dimensional design.	<b>4. Review</b> student drawing assignments with implementation of the organizing grid.
<b>5. Understand</b> some of the basic principles used in the appropriate selection of interior and exterior construction materials, finishes, products, components, and assemblies based on their inherent performance, including environmental impact and reuse.	<b>5. Review</b> student notebooks and drawing assignments with application of material properties, rules of thumb, and performance analysis.

Course Specific Learning Outcomes / Assessment Methods	
Learning Outcomes	Assessment Methods
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
<b>6. Layout plan drawings</b> by hand and with digital tools.	<b>6. Review</b> student plan assignments for accuracy and application of line weights and drawing conventions.
<b>7. Understand and apply</b> basic principles of structural characteristics of materials following rules of thumb.	<b>7. Review</b> student drawing assignments for accurate application of rules of thumb to sizing structural elements for a specific span.

Weekly Course Outline:

**MODULE I.a READING TEXT AND DRAWINGS**

This first section of the course is focused on building foundational skills for effectively reading technical texts, analyzing and summarizing these texts through concept mapping, careful note taking, and sketching and diagramming. This section also builds foundational skills about reading and understanding architectural drawings.

<b>CLASS 1</b>	<i>Activity/Assessment:</i> <i>Review:</i> <b>Homework:</b>	Reading Texts, Reading Drawings Course Concept Map Post Concept Map Reflection on OpenLab
<b>CLASS 2</b>	<i>Seminar:</i> <i>Reflection:</i> <i>Activity:</i> <i>Homework:</i>	Learning by Reading: Reading #1 Post Learning by Text Reflection Reading #1: Building Elements + Materials Post Reflection Reading #1 Reading #2: Egress + Stairs Concept Map
<b>CLASS 3</b>	<i>Seminar:</i> <i>Activity:</i> <i>Homework:</i>	Learning by Reading: Reading #2 Review Concept Map + Note Structure Post Reflection Reading #2 + Stair Sketches
<b>CLASS 4</b>	<i>Discussion/Activity:</i> <i>Reflection:</i> <b>Homework:</b>	Reading Drawings Post Reading Drawings Reflection <b>Scan, organize, submit Reading Notes #1,2</b>

**DELIVERABLES DUE:**

- SKETCHES
  - Stair Sketches
- READING #1 (ONE PDF FILE SUBMISSION)
  - Concept Map(s) Summary
  - Notes for Each Subsection
  - Key Sketches/Diagrams from Text
- READING #2 (ONE PDF FILE SUBMISSION)
  - Concept Map(s) Summary
  - Notes for Each Subsection
  - Key Sketches/Diagrams from Text
- REFLECTIONS POSTED TO BLOG
  - Concept Mapping
  - Learning by Text Discussion
  - Reading #1 What did I learn?
  - Reading #2 What did I learn?
  - Reading Drawings Exercise

## MODULE I.b CASE STUDY ORDER DIAGRAM AND BASE DRAWING STUDY

This section of the course is focused on building foundational skills for understanding the ordering of the case study building and the relationships between the plan, section, and elevation of the building.

<b>CLASS 5</b>	<b>SITE VISIT:</b> <i>Activity:</i>	<b>Case Study Site Analysis</b> Analysis: Geometry, Grid, Spatial Sequence
<b>CLASS 6</b>	<i>Drawing Lab:</i> <i>Activity:</i> <b>Homework:</b>	<b>Case Study Order Diagram</b> Diagram Development <b>Complete Diagram</b>
<b>CLASS 7</b>	<i>Drawing Lab:</i> <i>Activity:</i> <b>Homework:</b>	Case Study Plan, Section, Elev. Grid Lines and Floor Elevations <b>Complete Board Setup</b>
<b>CLASS 8</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Case Study Partial Floor Plan Develop Floor Plan Continue Floor Plan
<b>CLASS 9</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Case Study Partial Section Develop Partial Section Continue Section
<b>CLASS 10</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Case Study Partial Elevation Develop Partial Section Continue Elevation
<b>CLASS 11</b>	<i>Drawing Lab:</i> <i>Activity:</i> <b>Homework:</b>	Case Study Plan, Section, Elevation Finalize Plan, Section, Elevation <b>Complete board</b>
<b>CLASS 12</b>	<b>PIN UP REVIEW:</b>	<b>DIAGRAM + BASE DRAWING BOARD</b>
	<b>DELIVERABLES DUE:</b>	Scan and edit the two drawings. Convert into PDF format with the correct filename.  DRAWINGS Order diagram (ONE PDF FILE) Plan, Section, Elevation (ONE PDF FILE)  SKETCHES Site Geometry Analysis Sketches

## MODULE 2.a EXTERIOR MASONRY WALL SYSTEMS

This section of the course is focused on building foundational knowledge of the nature of masonry construction and how masonry wall types address various issues of the performance of exterior walls. This includes learning about building with stone and concrete masonry units (CMU) and the methods of laying these elements together to form exterior walls.

<b>CLASS 13</b>	<i>Seminar:</i> <i>Homework:</i>	Learning by Reading: Reading #3 Post Reflection Reading #3 Stone Masonry Reading #4 Masonry Wall Construction Concept Map
<b>CLASS 14</b>	<i>Seminar:</i> <i>Review:</i> <i>Homework:</i>	Learning by Reading: Reading #4 Masonry Wall Construction Concept Maps Post Reflection Reading #4 Masonry Wall Construction
<b>CLASS 15</b>	<b>SITE VISIT:</b> <i>Activity:</i> <i>Homework:</i>	<b>Masonry Analysis of Case Study Building</b> Masonry Sketches Post Reflection + Scan/Format Sketches

### DELIVERABLES DUE:

#### SKETCHES

Masonry Sketches

#### READING #3 (ONE PDF FILE SUBMISSION)

Concept Map(s) Summary  
Notes for Each Subsection  
Key Sketches/Diagrams from Text

#### READING #4 (ONE PDF FILE SUBMISSION)

Concept Map(s) Summary  
Notes for Each Subsection  
Key Sketches/Diagrams from Text

#### REFLECTIONS POSTED TO BLOG:

Reading #3 What did I learn?  
Reading #4 What did I learn?  
Learning About Masonry

## MODULE 2.b EXTERIOR MASONRY WALL SYSTEMS

This section of the course is focused on the process of studying an exterior wall in section, and plan and axonometric. The scale of the study focuses on the understanding of wall sections in general as an introduction to technical wall sections rather than on high resolution details.

<b>CLASS 16</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Exterior Wall Board Set Up Set out Guide Lines/Grid Lines Complete set out
<b>CLASS 17</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Exterior Wall Plan Detail Layout Layers of Exterior Wall in Plan Continue Plan Detail Development
<b>CLASS 18</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Exterior Wall Section Layout Layers of Exterior Wall in Section Continue Plan Detail Development
<b>CLASS 19</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Exterior Wall Section Integrate Window in Plan + Section Continue Wall Section Development
<b>CLASS 20</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Exterior Wall Axonometric Layout Layers of Exterior Wall Continue Axon Development
<b>CLASS 21</b>	<i>Drawing Lab:</i> <i>Activity:</i> <b>Homework:</b>	Exterior Wall Axonometric Develop Layers of Exterior Wall <b>Complete board</b>
<b>CLASS 22</b>	<b>PIN UP REVIEW:</b>	<b>Exterior Wall Board</b>

### DELIVERABLES DUE:

Scan and edit the drawing. Convert into PDF format with the correct filename.

### DRAWINGS

Exterior Wall Drawings (ONE PDF FILE)



## MODULE 3.b STRUCTURAL SYSTEMS

This section of the course is focused on demonstrating foundational knowledge of the nature of structural systems based on material properties and fabrication through the design of a basic structural system and depicting it in a three-dimensional diagram as well as component sections annotated with calculations and critical dimensions.

<b>CLASS 25</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Structural System Study System Calcs + Design, Element Sections Sketch System, Element Sections, and Calcs
<b>CLASS 26</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Structural System Study System Axon Geometry and Grid Setup Complete Board Setup
<b>CLASS 27</b>	<i>Drawing Lab:</i> <i>Activity:</i> <i>Homework:</i>	Case Study Structural Study Develop Axon, Layout Element Sections Complete Element Sections w/ Dimensions
<b>CLASS 28</b>	<i>Drawing Lab:</i> <i>Activity:</i>  <i>Homework:</i>	Case Study Structural Study Develop Axon + Annotations and Calculations Continue Axon, Sections, Annotations, Calcs
<b>CLASS 29</b>	<i>Activity/Assessment:</i> <i>Drawing Lab:</i> <i>Activity:</i>  <b>Homework:</b>	Reading Texts, Reading Drawings Case Study Structural Study Complete Axon + Annotations and Calculations <b>Complete board</b>
<b>CLASS 30</b>	<b>PIN UP REVIEW:</b> Course Reflection:	<b>Structural Study</b> Impact of Course Approach to Building Technical Knowledge through Reading, Notetaking, Site Visits, Sketching and Drawing

### DELIVERABLES DUE:

Scan and edit the drawing. Convert into PDF format with the correct filename.

#### DRAWINGS

Structural Study (ONE PDF FILE)

#### SKETCHES

Struct System Design, Sections, and Calcs

#### REFLECTION

Impact of Course Approach to Building  
Technical Knowledge through Reading,  
Notetaking, Site Visits, Sketching and  
Drawing

**Learning Activities:**

Course format will include a combination of any of the following activities:

- **Site Visits / High Impact Learning Practices:**  
Site trips will look to visit existing buildings and construction sites, tour newly constructed buildings and urban spaces or visit institutions, including but not limited to museums, churches, or other colleges with discussions led by either the instructor or on-site experts in the field or the subject.
- **Discussions:**  
Discussions will be led by a qualified instructor and if warranted invited guest lecturers or experts in the field or subject.
- **Activities:**  
Students will participate in activities that provide them with the opportunity to apply what is learned in a given subject.
- **Research Activities:**  
Students will be given directed readings and be required to correlate their readings with the lab exercises. Supplemental research will be encouraged to promote a greater analytical and critical understanding.
- **Presentations:**  
Students will participate in written, oral and graphic presentation of course subjects and issues identified through their reading, writing, and lab work.

**Class Submittals List:** Following is a list of submittals that will be due throughout the course of the semester. They are subject to change:

**Drawing Assignments:**

ORDER DIAGRAM AND BASE DRAWING STUDY:

Plan, Elevation, Section

EXTERIOR WALL STUDY

Plan Detail, Wall Section, Axonometric

STRUCTURAL STUDY

System Axon, Component Sections, Calcs

Note: Grades for Incomplete Assignment Submissions will be pro-rated per % of missing drawings

**Sketchbook Assignments:**

Stair Sketch Documentation

Case Study Geometry Analysis

Case Study Masonry Analysis

Structural Walk

Structural System Design Sketches

**Notebook Assignments:**

Reading Notes and Sketches for Readings #1-6 covering **all sections and subtopics** listed in the reading list below.

## READINGS:

### #1 Building Elements + Materials:

#### *Building Construction Illustrated*

Building Elements	2.02-2.03
Stone	12.10
Brick/CMU	12.06-12.07
Wood	12.11-12.14
Steel	12.08
Concrete + Reinforcement	12.04-12.05

### #2 Stairs + Egress:

#### *Building Construction Illustrated*

Egress	A.10-A.11
Stair Design	9.03
Stair Requirements	9.04-9.05
Configurations	9.06-9.07

### #3 Stone and Concrete Masonry

#### *Fundamentals of Building Construction*

##### **Stone Masonry** Chapter 9

- Intro
- Types of Building Stone
- Granite Group
- Limestone Group
- Quartz-based Dimensions Stone Group
- Slate Group
- Marble + Other Group
- Brick Classification
- Quarrying and Milling Stone
- Selecting Stone for Buildings
- Stone Masonry
- Sustainability in Stone + Concrete Masonry

##### **Concrete Masonry** Chapter 9

- Manufacture
- Laying Concrete Masonry
- Economic/Utility of Concrete Masonry Construction
- Other Types of Masonry Units

### #4 Masonry Wall Construction

#### *Fundamentals of Building Construction*

##### **Masonry Wall Construction** Chapter 10

###### *Types:*

- Composite Masonry Walls
- Masonry Cavity Walls
- Masonry Loadbearing Walls

###### *Spanning Systems:*

Ordinary Joist  
 Heavy Timber  
 Steel and Concrete Decks  
*Detailing:*  
 Cavity Drainage and Flashings  
 Thermal Insulation

#5 Structural Forces, Components, Types: *Building Construction Illustrated*

Forces	2.11-2.12
Columns	2.13
Beams Spans Trusses	2.14-2.16
Frames Walls Plates	2.17-2.18
Arches Vaults Domes	2.25-2.26
Joints Connections	2.30
Structural Units	2.19
Structural Spans	2.20
Structural Patterns	2.21
Lateral Stability	2.22-2.23
Floor Systems	4.02-4.03
Wall Systems	5.02-5.03

#6 Structural Systems

*Building Construction Illustrated*

<i>Concrete:</i>	
Reinforced Concrete	4.04-4.07
Precast Concrete	4.11-4.13
Concrete Columns	5.04-5.05
<i>Steel:</i>	
Steel Framing, Beams	4.14-4.18
Steel Decking	4.22
Steel Columns, Framing	5.35-5.38
<i>Wood:</i>	
Wood Horizontal Struct	4.26-4.40
Wood Columns + Framing	5.47-5.49
<i>Masonry:</i>	
Masonry Walls	5.14-5.21
Masonry Wall Sections	5.23-5.25
Masonry Bonding	5.26-5.27
Stone Masonry	5.33-5.34