IBC Code Mapping for Architects: excerpt

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Navigating the International Building Code (IBC) can be somewhat complicated, puzzling and time consuming. This course, *Code Mapping for Architects*, is intended to help guide designers through this circuitous labyrinth quicker and with confidence. Viewed through an architect's lens during the early evolution of a design, the mapping presents an approachable path through the IBC's 35 chapters with some 325 sections, which affect the formation of a design and consequently the building construction. With a map of the key codes, a design can absorb the regulations early, with less difficulty, and can mature with assurance that it has accounted for the codes it's required to be in compliance with.

Determining the applicable building codes in a timely manner contributes to the successful progression of a design and its eventual construction and cost. Rooting a design in building code allows the designer's creativity to flourish within the set limitations defined in the IBC and minimizes the risk of going in a direction that may lead to a dead end. Likewise, the designer's awareness of the I-Codes, and for our primary focus the IBC, makes a design more resilient to adjustments the codes will require during its development. This reduces lost time spent in the design process, and ensures the design is in alignment with its fundamental responsibility: to protect the Public Health, Safety and General Welfare.

"Codes act as boundaries for design options that can be considered. Therefore, full awareness of all codes is a crucial foundational element to solid design decisions for any client." -Botti-Salitsky, Programming and Research

Throughout the design process *accounting* for the codes and standards which influence design decisions is central to the success of a good design. Knowing which edition/s and section/s are applicable to a specific project, and in what order of priority to engage the codes, affects early ideas, concepts, and decisions that follow. It's necessary to integrate building codes and standards into design thinking strategies as early as possible in order for the creative process to flow efficiently and in a fluid manner. Codes should not be considered as an overlay onto the design, but as an underpinning of the design: they are underlying building blocks which designers are tasked to *assemble, layer, and interlock*.

With this approach, codes are thought of as design elements similar to other principles and elements in our design lexicon. By including these as a pivotal part of our design thinking strategies, we can produce an integrated design more quickly, with reduced costs in both the design process and the subsequent construction. Accordingly, knowledge of building codes can be thought of as a sustainable principle for a designer: when codes are incorporated at the start of the design process, the designer can focus their artistic talents into aligning code requirements with their other valued design principles synergistically, reducing wasted creative energy and physical resources.

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I liken building codes to gravity, heat, wind, rain, snow, lightning, and earthquakes - inherent forces design must solve for, with a holistic solution.

IBC Code Mapping

The ICC has granted permission to include the referenced IBC Tables. Some tables have been shortened in their length (excluding some supplementary information and conditional footnotes) to fit within the depth of the code investigation we'll accomplish in this course.

For referenced sections and tables in their entirety refer to the 2018 IBC. "Copyright 2017, International Code Council, Inc., Washington, D.C. Reproduced with permission. All rights reserved." www.iccsafe.org

The I-Codes are model codes. Local authorities adopt codes using the model codes as the basis for their requirements. They may choose to adopt as is, or make changes as they deem appropriate. Your local jurisdiction may also be using an older edition of the I-Codes.

The I-Codes provide the *minimum safeguards*. Based on your application, an I-Code minimum standard may not be considered sufficient. The local AHJ may reject the minimum standard – in their opinion – and require a more stringent standard. *Always check with your local AHJ regarding their minimum standards.*

The following Code Mapping is based on the 2018 IBC, which contains 35 Chapters and 14 Appendices.

Chapter 1: Scope And Administration
Chapter 2: Definition
Chapter 3: Use And Occupancy Classification
Chapter 4: Special Detailed Requirements Based On Use And Occupancy
Chapter 5: General Building Heights And Areas
Chapter 6: Types of Construction
Chapter 7: Fire and Smoke Protection Features
Chapter 8: Interior Finishes
Chapter 9: Fire Protection Systems
Chapter 10: Means Of Egress
Chapter 11: Accessibility
Chapter 12: Interior Environment
Chapter 13: Energy Efficiency
Chapter 14: Exterior Walls
Chapter 15: Roof Assemblies And Rooftop Structures
Chapter 16: Structural Design
Chapter 17: Structural Tests And Special Inspections
Chapter 18: Soils And Foundations
Chapter 19: Concrete
Chapter 20: Aluminum
Chapter 21: Masonry

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Chapter 22: Steel
Chapter 23: Wood
Chapter 24: Glass And Glazing
Chapter 25: Gypsum Board And Plaster
Chapter 26: Plastic
Chapter 27: Electrical
Chapter 28: Mechanical Systems
Chapter 29: Plumbing Systems
Chapter 30: Elevators And Conveying Systems
Chapter 31: Special Construction
Chapter 32: Encroachments Into The Public Right-Of-Way
Chapter 33: Safeguards During Construction
Chapter 34: Reserved
Chapter 35: Referenced Standards
Appendix A: Employee Qualifications
Appendix B: Board of Appeals
Appendix C: Group U-Agricultural Buildings
Appendix D: Fire Districts
Appendix E: Supplemental Accessibility Requirements
Appendix F: Rodentproofing
Appendix G: Flood-Resistant Construction
Appendix H: Signs
Appendix I: Patio Covers
Appendix J: Grading
Appendix K: Administrative Provisions
Appendix L:Earthquake Recording Instrumentation
Appendix M: Tsunami-Generated Floor Hazard
Appendix N: Replicable Buildings

We'll be focusing on the ***bold italicized chapters*** above: these chapters are key in the design process. We'll apply a building component module method as a framework to investigate these chapters synchronistic with the development of a design. Through this method, knowing *what to account for, where to look and when to look* are brought together to make the IBC easier to access and apply.

For me, the following mantra is helpful:

Account for Regulations
Accommodate within Concept
Assemble in Schematic
Integrate into Design

Adjacent to each code section is a corresponding (letter) associated with the phase when it's timely to analyze and/or apply the code comprehensively. Please keep in mind: *the less going backwards the more efficient we are.*

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(C) ***(S)*** ***(DD)*** ***(CD)***

Concept - Schematic - Design Development - Construction Documents

Code Analysis Progression:

The following framework is what I utilize to access the IBC when designing a building. The mapping is organized into eight modules starting from 'Building Use' to 'Interior Surface'. Each module contains code building blocks that affect how the previous and following module building blocks are linked and applied.

Within each module are the essential mainstream codes of the module topic in order of priority to investigate. The module contains associated chapters and sections from the IBC and a few other sources which interrelate with the component. These cross-referenced chapters and sections may need to be considered concurrently as the design entails.

The module framework links IBC terminology to common AEC vocabulary to help identify how the codes relate to and affect a design. The modules are organized from the broadest question of building use into specific building systems and elements which impact the formation of a building.

1. Building Use: *Program & Occupancy*
2. Construction Type: *Structure & Size*
3. Building Elements & Envelope: *Fire Rating & Openings*
4. Means of Egress System: *People & Circulation*
5. Accessibility: *Access & Area Requirements*

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6. Interior Environment: *Systems & Mechanics*
7. Interior Elements: *Fire-Resistant Assemblies*
8. Interior Surface: *Materials & Finishes*

This sequence of inquiry works for me in locating and accounting for a project's building codes. The order may shift depending on the scope of work and what fits best in your design process. You can adjust, subtract and/or add as you see fit. Each project's specific requirements determine the module's percentage of investigation.

At this stage in the design process, we've analyzed the client/s objectives, budget, site, municipal planning ordinances and all other governing agencies' requirements which regulate the project. Our pre-design due diligence has set some of our initial parameters for the direction of the design. With this collection of information in hand, we can now undertake a focused Building Code Analysis which will affect design decisions. Through this analysis process we can ensure the design is in compliance with the applicable codes.

As we begin our investigation, it's important to note: the following discussions of codes deal 'only' with the subject matter of each. It's imperative for the designer to scrutinize each section, and all subsections and tables, in their entirety before determining how a code applies or does not apply to a specific design.

Code Mapping Module's Investigation: 32 pages

At this point of our code review we've covered significant portions of the IBC, all of which have formational impacts on the development of a design. The designer needs to be assured at each phase of the design process that the required building codes have been accounted for and integrated as a particular phase necessitates. These 125 sections, subsections and tables should be of assistance in this investigation. No doubt, I've excluded sections that might apply to your specific project. *This mapping is not exhaustive, it's a framework for you to add to, subtract from or shift, as you see fit to be useful in your work.* For further inquiry, use the IBC Table of Contents and Index as a reference to your question. Contact your AHJ for clarification as needed.

Code Mapping in Action:

As the architect of record for a multifamily project where we were tasked to design a new R-2 Type VB building on a site containing an existing R-2 Type VB building with residents living within it. Because of the site's physical constraints, the new building had to be located 1" away from the existing structure for the new program to fit into the site. This new condition required a fire wall between the buildings. The existing building was to remain as is with the addition of a new exterior entrance canopy.

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I communicated with the Fire Marshal and Building Official intermittingly during the schematic phase to review the scope of the project, to ensure we were accounting for all the state and municipal Life Safety and Fire Prevention Requirements. At that time in the design process, we were in agreement of the required fire separation rating without installing a new automatic sprinkler system into the existing building.

With this understanding we proceeded to design the new building accordingly, incorporating the applicable state and municipal building and fire codes. Specifically, we had specified a NFPA 13D System for the new structure only. During the building permit review process the Fire Marshal changed his position and requested a NFPA 13R System for both buildings. As architect, I agreed that sprinklering the existing building would improve the fire prevention level for the project; however, in this specific circumstance, the additional requirement had numerous impacts on the feasibility of the project.

Here's where submitting an Alternate Materials and Method of Construction to the AHJ was necessary. The AMMC was our only means to make the official case that the additional sprinkler system was not required. We documented the applicable codes that permitted a new building to be located adjacent to an existing independent building without the existing adjacent building required to be sprinklered. The chief Building Official, plan examiner and Fire Marshal reviewed the AMMC and then approved the project without the additional sprinkler requirement. The AHJ approved the design as submitted with minor modifications which did not impact the feasibility of the project.

This was where code mapping, plus code analysis worksheets with code summary drawings, were beneficial to the project success.

For code mapping to be fully effective, I recommend developing your own *code analysis worksheets* to document your code considerations. From these worksheets you can develop *code summary drawings* that clearly illustrate the applicable code requirements have been included in the design drawings. Many AHJ have their own checklist or require similar type of documentation to verify the required codes have been integrated satisfactorily.

Code Documentation: Double check =Triple check = Control $

I hope code mapping has strengthened your approach into the IBC and contributes toward the success of your projects.

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Appendix:

- Code Analysis Worksheet
- Code Summary Drawing

Example: this is 1 of 12 Worksheets.

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CODE ANALYSIS WORKSHEETS

2018 IBC EDITION

SECTION 2 – BUILDING CONSTRUCTION					
List Construction Type(s) used in the design (IA, IIIB, VA, etc.):					
			Allowed	Purposed	
Building Height (per IBC Table 504.3)					
Number of Stories (per IBC Table 504.4)					
Floor Area (per IBC Table 506.2)					
Are Automatic Sprinklers used for Height Modifications? (per IBC Section 504)				YES	NO
Is there a basement?	YES	NO	**If YES, List square footage of basement and grade elevations on CS sheets.**		

BUILDING HEIGHTS AND AREAS

USE GROUP	TYPE	A or B	(A) BLDG AREA PER STORY (ACTUAL)	(B) ALLOWABLE AREA Table 506.2	(C) AREA FOR SPRINKLER INCREASE	(D) AREA FOR FRONTAGE INCREASE	(E) ALLOWABLE AREA OR UNLIMITED	(F) MAX. STORIES

1. Type equals Construction Type
2. If there are multiple construction types, or if a fire wall divides the building, provide a separate analysi for each area. Repeat as necessary.

Area Limitations for Each ProposedIBC Use or Occupancy Group	Occupancy - 1	Occupancy - 2	Occupancy - 3	Occupancy - 1
IBC Use / Occupancy Group IBC Chapter 3 and 4				
Type of Construction (IBC Table 601)				
Fire sprinkler system design type (IBC 903.3) NFPA 13, 13R, 13D, None				
Allowable Building Height in feet above grade plane. (IBC Table 504.3)				
Fire sprinkler Factor (IBC Table 504.4 footnote) NS, S, S13				
Allowable Number of Stories above grade plane. (IBC Table 504.4)				
Fire sprinkler Factor (IBC Table 506.2 footnote) NS, S1, SM				
Allowable Area in Square Feet (IBC Table 506.2)				

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Example: this is 1 of 5 Code Summary Drawings.

Code Summary Drawing which includes the minimum depending on scope of work:

- Occupancy Group
- Occupancy Separations
- Construction Type
- Fire Rated Walls & Floor/Ceilings
- Sprinkler System
- Exterior Walls Separation Distance
- Exterior Wall Openings
- Means of Egress Path of Travel
- Accessibility

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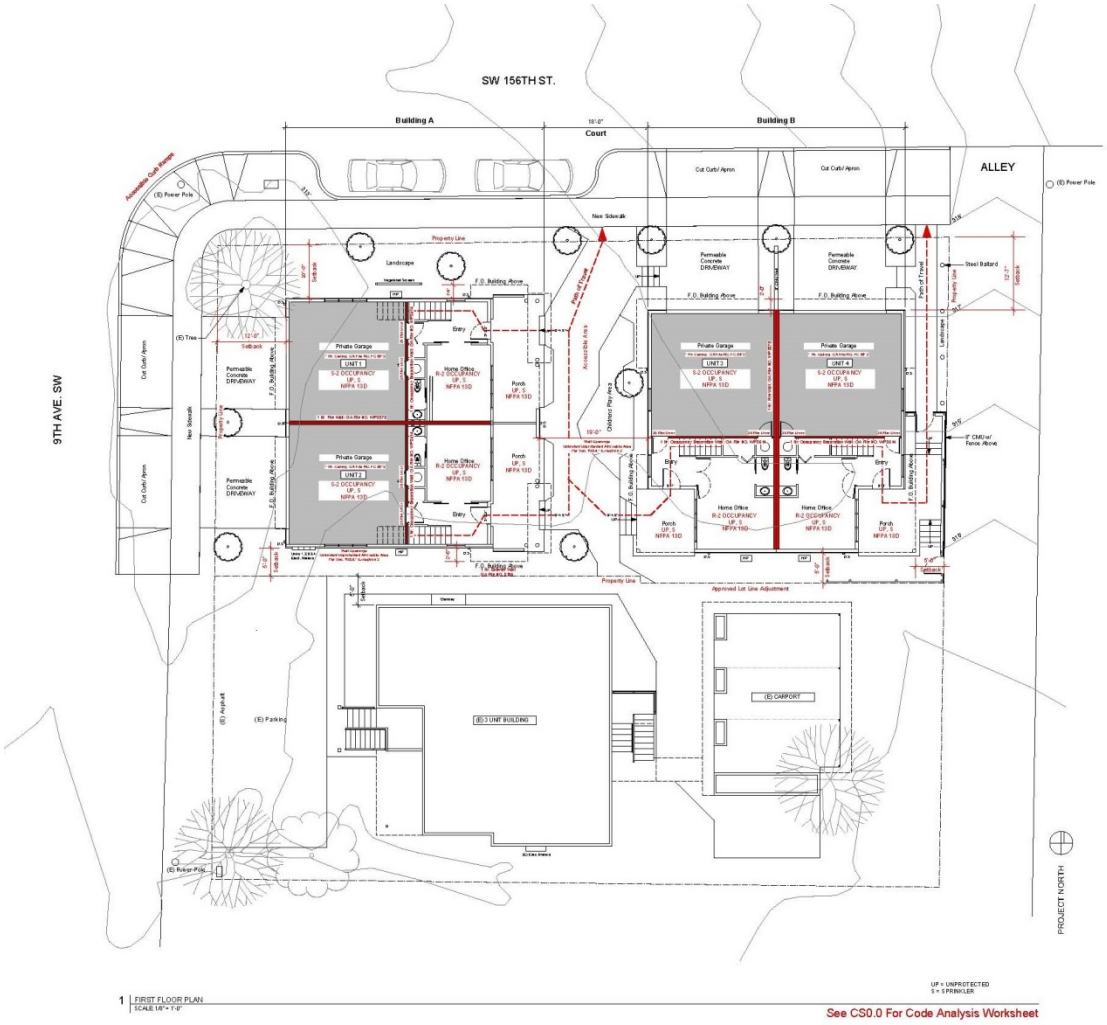

1 FIRST FLOOR PLAN
SCALE 1/8" = 1'-0"

See CS0.0 For Code Analysis Worksheet

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R-2 TOWNHOMES

Issue Name:	Date:

SCALE:
CHECKED BY:
JOB NO:
SHEET
CS0.1

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