

CONST-181

Building Code Interpretation:

Non-Structural

Topics

- The History of Building Codes
- What are Building Codes?
- Why are Building Codes Important?
- Who's Involved?
- What are the Available Tools?

HISTORY OF BUILDING CODES

Building Codes- BC

Codes of Hammurabi – 2000 BC

- “In the case of collapse of a defective building, the builder is to be put to death if the owner is killed by accident; and the builder’s son if the son of the owner loses his life...”

Socrates – 341 BC

- He shall set the joists against each other, fitting, and before inserting the dowels he shall show the architect all the stones to be fitting, and shall set them true and sound and dowel them with iron dowels, two dowels to each stone...”

Origins of Modern Codes

- Insurance industry: Establish standards to minimize accidents/claims.
- Social organizations: Eliminate neglect and impact on health.
- Local governments: Develop regulations to deliver health and safety to taxpayers.
- Disasters: Mitigate loss of life and property based on public demand.

WHAT ARE BUILDING CODES?

What are Building Codes?



Jimmy and Debbie Bishop's house survived Hurricane Ike nearly unscathed.

Source: Roy Tyson/FEMA

- Building codes specify the minimum legal design and construction requirements for a given jurisdiction:
 - Structural integrity
 - Construction materials
 - Fire protection
- Consistent standard

Why Building Codes ?



California Building Code Part 2 of Title 24	Effective Date	Model Code
1981	See history note appendix	UBC 1979
1985	See history note appendix	UBC 1979, 1982, 1985
1989	July 1, 1989	UBC 1988
1992	July 1, 1992	UBC 1991
1995	January 1, 1996	UBC 1994
1998	July 1, 1999	UBC 1997
2001	November 1, 2002	UBC 1997
2004	2001 CBC remains in effect	
2007	January 1, 2008	IBC 2006
2010	January 1, 2011	IBC 2009
2013	January 1, 2014	IBC 2012
2016	January 1, 2017	IBC 2015
2019	January 1, 2020	IBC 2018

Who is involved in developing the codes?



AIA

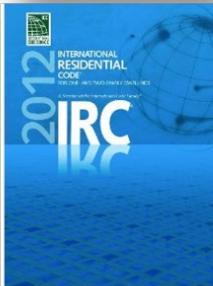


FEMA



- The International Code Council (ICC) develops codes in collaboration with:
 - Federal Emergency Management Agency (FEMA)
 - Other Federal, states, local and private authorities

What are the different I-Codes?



The International Code Council (ICC) family of codes covers all aspects of construction and includes (but is not limited to):

- International Building Code (IBC): Applies to new and existing buildings, except those residential buildings covered under the International Residential code.
- International Residential Code (IRC): Applies to new and existing one- and two-family dwellings and townhouses of not more than three stories in height.

What are the different I-Codes?

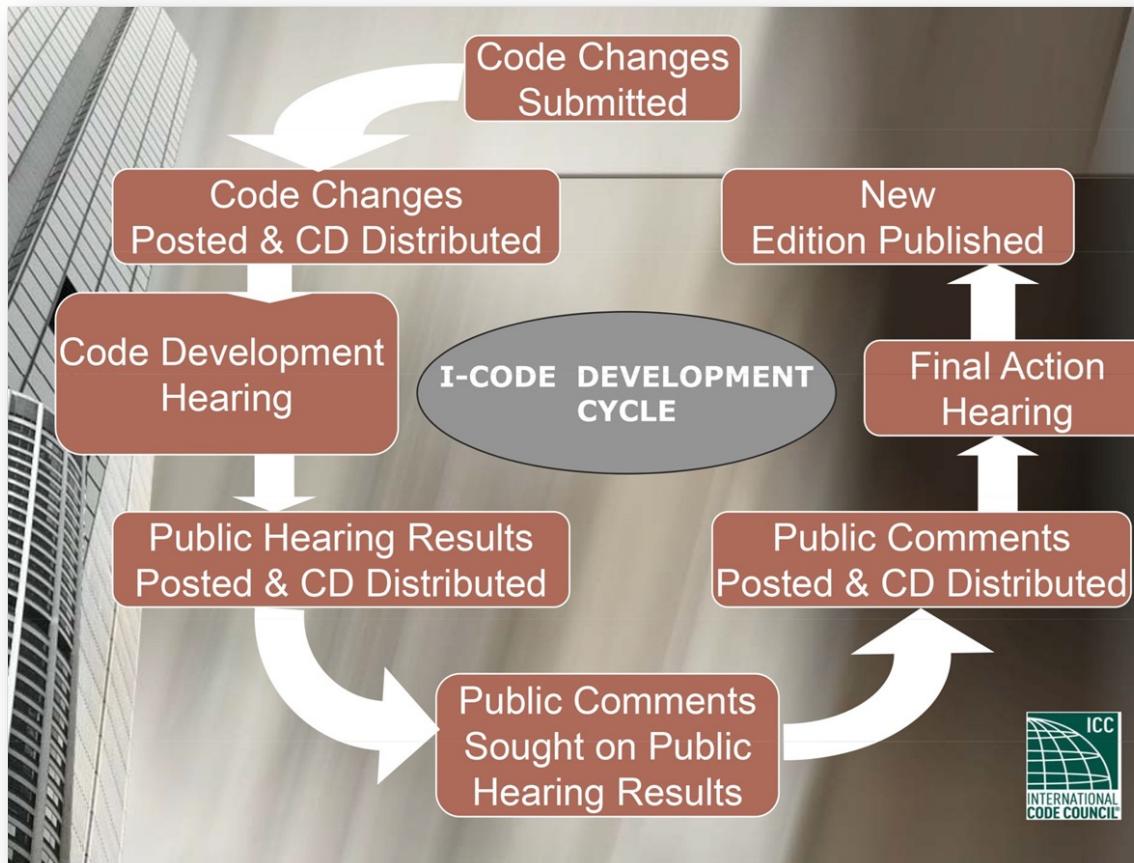
- International Property Maintenance Code (IPMC): Applies to all existing buildings and addresses maintenance issues for continued safe use of buildings.
- International Existing Building Code (IEBC): Applies to the alteration, repair, addition, or change in occupancy of existing structures.
- International Fire Code (IFC): Applies to fire and explosion hazards.

What are the different I-Codes?



- International Green Construction Code (IgCC): Applies to sustainability measures to make buildings green.
- International Zoning Codes (IZC): Promotes uniformity and consistency in zoning for city planners, code officials and developers.
- ICC Performance Code for Buildings and Facilities (ICCPC): Presents regulations based on outcome rather than prescription.

I-Code Development Cycle



WHY ARE BUILDING CODES IMPORTANT?

Building Codes Save Lives



A tornado safe room was not required by local building code but Tom Cook of Joplin, MO, built one anyway. It probably saved his and his daughter's life.

Source: Springfield news-Leader

Building Codes Protect Your Investment



- Reduce property and financial losses
- Recover fast
- Protect community tax base

Photo:

Top: Insufficiently embedded pilings in Daughin Island, AL, post Katrina.

Bottom: This post-Katrina retrofit is built to code.

Source: FEMA 549

Building Codes Save on Insurance



- Premium discounts:
 - Wind
 - Fire
 - Flood
 - Earthquake
- Reduced flood insurance rates.
- Everyone benefits when money is saved and losses are avoided.

Photo:

Top: This home had structural damage from trapped floodwaters.

Bottom: Bruce Colby of Slidell, LA, installed \$600 in flood vents, saving \$700 each year in flood insurance.

Source: FEMA Best Practice

Building Codes Increase Disaster Resilience



- Safeguard property and provide minimum life safety protections.
- Enable the continuation of operations and essential services.
- Allow individuals and families to rapidly recover with minimal costs.

Photo:

A FEMA worker hugs a Pope County, AR, resident whose home was damaged by a tornado. Building codes reduce damage and save lives.

Source: Leif Skoogfors/FEMA

IBHS Wind Lab Test



This is a video depicting why building codes and proper construction matters.
IBHS Research Center.

Source: Insurance Institute for Business & Home Safety, South Carolina

Building Codes Enhances Building Stock



Building code provisions enhance the Nation's building stock over time by:

- Adopting codes for new construction.
- Regulating existing structures and trigger upgrades.
- Enacting legislation to supplement codes by mandating improvements or encouraging improvements through incentive programs.

Photo:

A new home being built after the Hardy Family's home was destroyed in 2011 when a string of deadly tornadoes swept through Alabama.

Source: Ruth Kennedy/FEMA

WHO'S INVOLVED?

Roles of ICC, FEMA, and Design Community

- Development: Building codes are developed by a coalition of national organizations and experts.
- Outreach: FEMA, ICC, and other partner organizations work together to educate and promote the value of building codes by sharing best practices and available resources.
- Training: FEMA and ICC provide training options to educate and promote the adoption, enforcement, and use of building codes with communities.
- Partnership: FEMA, ICC, and other partner organizations work together to ensure building codes are developed, adopted, enforced, and promoted nationwide.

Role of Insurance Industry



FEMA Community Relations team member speaks about available federal aid to victims affected by a deadly tornado that hit in 2011. An insurance agent waits her turn.

Source: Liz Roll/FEMA

- The insurance industry has a vested interest to support the adoption of strong statewide building codes.
- By making buildings more resistant to damages, a property owner will have fewer insurance claims which results in less pressure on the insurance marketplace.
- Some insurance companies offer premium discounts.

Role of Emergency Managers



FEMA Community Relations representative, Linda Colon and Cabo Rojo Emergency Manager, Herbert Rodriguez listen to resident in flooded neighborhood.
Source: Andrea Booher/FEMA

- Building Codes and emergency planning
- Building Codes as a requirement for construction grants
- Building relationships with local building code officials and the development community

Roles of States and Local Jurisdictions



A county official inspects the wiring in a FEMA supplied mobile home in California.

Source: Amanda Bicknell/FEMA

- Adoption and Enforcement
- Building/Code Official
 - Officer charged with the administration/enforcement of the codes or a duly authorized representative.
- Building Inspector
 - Individual tasked with verifying whether construction is done according to plan.

Roles of Contractors, Architects, Engineers

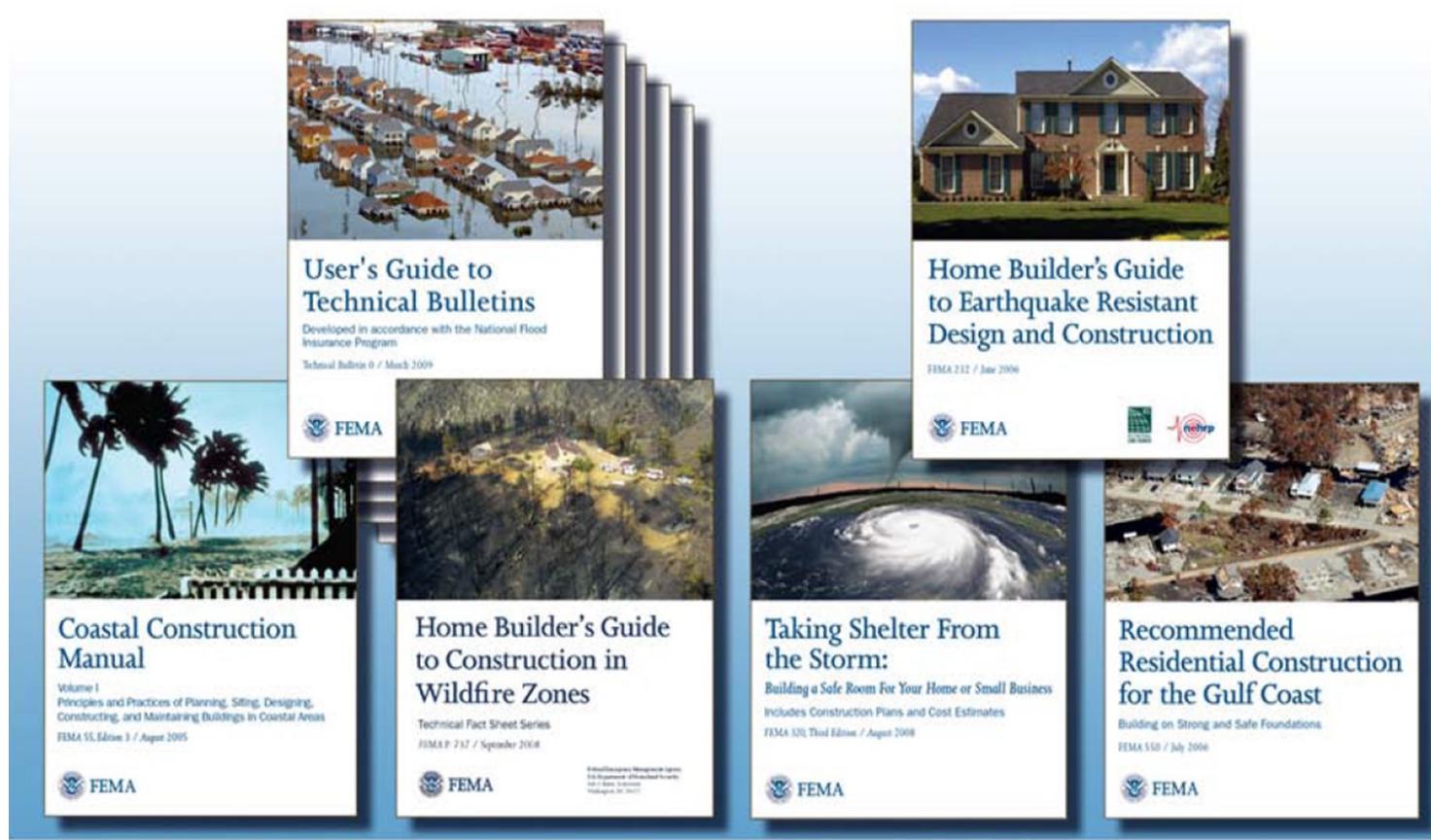


Auburn University Professor Paul Holley discusses the design of FEMA's DAWG HAUS with FEMA HPA Engineer James Crawford III.
Source: Ruth Kennedy/FEMA

- General Contractor
 - An organization or individual that is hired for the construction of a structure.
- Architect
 - An individual who initiates the building design.
- Engineer
 - Individual tasked with calculating, fitting, and determining the structural systems to be used for the project.

WHAT TOOLS ARE AVAILABLE?

FEMA Publications & Technical Guidance



Chapter 1 & 35: Learning Objective

To obtain an understanding of the administrative provisions of the International Building Code.

- Understand the scope and purpose of the code,
- Duties of the building official
- Issuance of permits
- Inspection procedures
- Special inspections
- Existing buildings and referenced standards.

Fundamental Purpose of IBC

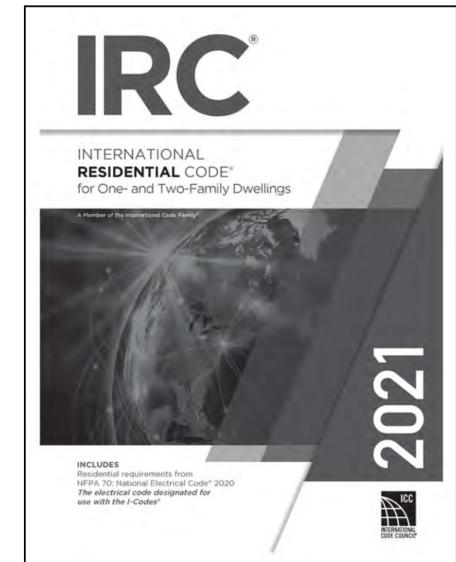
- Safety of building occupants
- Safety of fire fighters and emergency responders
- Safety and protection of others' property
- Safety and protection of own property

Introduction

- The provisions of the International Building Code shall apply to the construction, alteration, relocation, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

Introduction: Exception

- Detached one- and two-family dwellings and multiple single-family dwellings (town-houses) not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with the IBC or the International Residential Code.



Source: 2021 IBC: IBC 101.2, Exception

Introduction: Exception

The *International Residential Code* is applicable to townhouses a maximum of _____ above grade plane in height and provided with separate means of egress.

- a. 35 feet
- b. 40 feet
- c. three stories
- d. four stories

IBC Appendix

- Provisions in the appendices shall not apply unless specifically adopted.

Appendix A	Employee Qualifications
Appendix B	Board of Appeals
Appendix C	Group U — Agricultural Buildings
Appendix D	Fire Districts
Appendix E	Supplementary 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 Flood Hazard
Appendix N	Replicable Buildings
Appendix O	Performance-Based Application

Conflicts between IBC and referenced codes

Provisions of the appendix do not apply unless _____.

- a. specified in the code
- b. applicable to unique conditions
- c. specifically adopted
- d. relevant to fire or life safety

International Existing Building Code (IEBC)

- The provisions of the International Existing Building Code shall apply to matters governing the repair, alteration, change of occupancy, addition to and relocation of existing buildings.



Source: 2021 IBC: **Reference:** IBC 101.4.7

102.4 Conflicts between IBC and referenced codes

- The codes and standards referenced in the IBC shall be considered part of the requirements.
- Where conflicts occur between provisions of the IBC and referenced codes and standards, the provisions of the IBC shall apply.
- The IBC is, for the most part, a performance-based code, relying on numerous referenced standards to assist the builder and code official in its application. Where standards are referenced in the body of the IBC, the applicable portions of the standard relating to the specific code provision under consideration are considered a part of the code. However, where a referenced standard contains requirements that parallel those in the IBC, the requirements of the IBC take precedence.

IBC Appendix

If there is a conflict in the code between a general requirement and a specific requirement, the _____ requirement shall apply.

- a. general
- b. specific
- c. least restrictive
- d. most restrictive

103 Code Compliance Agency

- The building official is an appointed officer of the jurisdiction and charged with the administrative responsibilities of the department of building safety. It is not uncommon for the jurisdiction to use a different position title to identify the building official, such as Chief Building Inspector, Superintendent of Central Inspection or Director of Code Enforcement. Regardless of the jurisdictional title, the code recognizes the individual in charge as the building official.

103 Code Compliance Agency



Inspectors, plan reviewers and other technical staff members are typically given some degree of authority to act for the building official in the decision-making process, including the making of appropriate interpretations of various provisions of the code.

103 Code Compliance Agency

The _____ is considered by the code as the term to describe the individual in charge of the code compliance agency.

- a. building official
- b. code official
- c. code administrator
- d. chief building inspector

104.1 Duties and Powers of Building Official

- The building official is hereby authorized and directed to enforce the provisions of the IBC. The building official shall have the authority to render interpretations of the IBC and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of the IBC. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in the IBC.

(Jurisdiction)		Photo
Department of Building Safety		
<hr/> Name of individual _____		
<hr/> Job function _____		
The individual identified on the badge is a duly authorized employee of (the Jurisdiction) and is a designated representative of the Department of Building Safety.		
Valid through	Date	Building Official

**Sample of Required Identification
Section 104.5**

Although the IBC gives broad authority to the building official in interpreting the code, this authority also comes with great responsibility. The building official must restrict all decisions to the intent and purpose of the code, with the waiving of any requirements being strictly prohibited.

Source: 2021 IBC: IBC 104.1

104.1 Duties and Powers of Building Official

The building official has the authority to _____ the provisions of the code.

- a. ignore
- b. waive
- c. violate
- d. interpret

104.8 Duties and Powers of Building Official

- The building official, member of the board of appeals or employee charged with the enforcement of the IBC, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by the IBC or other pertinent law or ordinance, shall not thereby be civilly or criminally rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

104.11 Duties and Powers of Building Official

- The provisions of the IBC are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by the IBC; provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed alternative meets all of the following:
 - The alternative material, design or method of construction is satisfactory and complies with the intent of the provisions of the IBC, and
 - Provides established equivalency to that prescribed in the IBC.

104.11 Duties and Powers of Building Official

In order for an alternative material, design or method of construction to be considered acceptable, it must be equivalent to the code based on all but which of the following criteria?

- a. durability
- b. practicality
- c. strength
- d. fire resistance

104.11.1 Duties and Powers of Building Official

- Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in the IBC, shall consist of valid research reports from approved sources.



Although ICC Evaluation Service Reports are generally recognized nationally as valid reports developed by an approved source, the building official is the final authority on the acceptance of any research report for the purpose of accepting an alternate material, method or design.

Source: 2021 IBC: IBC 104.11.1

104.11.1 Duties and Powers of Building Official

Tests performed by _____ may be required by the building official where there is insufficient evidence of code compliance.

- a. the owner
- b. the contractor
- c. an approved agency
- d. a design professional

105.1-2 Permits

- Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure . . . shall first make application to the building official and obtain the required permit. See thirteen exemptions where a building permit is not required. Exemptions from permit requirements of the IBC shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of the IBC or any other laws or ordinances of this jurisdiction.

105.1-2 Permits: Work exempt

Work exempt from permit:

- One-story detached accessory buildings where limited to 120 square feet in floor area
- Fences not over 7 feet high
- Oil derricks
- Retaining walls limited to 4 feet in height, unless supporting a surcharge or impounding Class I, II or III-A liquids
- Water tanks supported directly on grade, limited to capacity of 5,000 gallons and a ratio of height to diameter not exceeding 2 to 1
- Sidewalks and driveways limited to 30 inches above grade, not over any basement or story below, and not part of an accessible route
- Painting, papering, carpeting, cabinets, counter tops and similar finish work
- Temporary motion picture, television and theater stage sets and scenery
- Prefabricated swimming pools accessory to a Group R-3 occupancy when capacity is limited to 5,000 gallons, depth limited to 24 inches and installed entirely above ground
- Shade cloth structures used for nursery or agricultural purposes
- Swings and other playground equipment accessory to detached one- and two-family dwellings
- Window awnings supported by an exterior wall in Groups R-3 and U, where the maximum projection is 54 inches
- Movable fixtures, racks, cases, counters and partitions limited to 5 feet 9 inches in height

Whether or not a building permit is required by the code, it is intended that all work be done in accordance with the code requirements. The owner is responsible for all construction being done properly and safely.

107.1 Submittal Documents

- Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets, or in a digital format where allowed by the building official, with each permit application. The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. See the exception for projects where nature of work is such that review of construction documents is unnecessary.



Source: 2021 IBC: IBC 107.1

108 Temporary Structures and Uses

- The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause. The building official is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.



Source: 2021 IBC

108 Temporary Structures and Uses

Unless extended by the building official, what is the maximum time period allowed to be granted for a permit issued on a temporary structure?

- a. 90 days
- b. 180 days
- c. 1 year
- d. 2 years

109 Permit Fees

- The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause. The building official is authorized to terminate such permit for a temporary structure or use and to order the temporary structure or use to be discontinued.

PERMIT APPLICATION		
→NOTE! INCOMPLETE OR ILLEGIBLE APPLICATIONS CANNOT BE PROCESSED.←		
APPLICATION IS HEREBY MADE FOR PERMISSION TO: (PLEASE PRINT Or TYPE Detailed Description of Work To Be Done)		
Has work commenced on this project? No _____ Yes _____		
PROJECT NAME _____	SUBDIVISION _____	
PROJECT ADDRESS _____	PARCEL _____	LOT# _____
PROJECT TYPE <input type="checkbox"/> Residential <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> New <input type="checkbox"/> Alteration / Remodeling <input type="checkbox"/> Addition <input type="checkbox"/> Demolition		
APPLICANT'S VALUATION \$_____	CITY'S VALUATION \$_____	TOTAL SQUARE FEET _____
WATER METER SIZE: _____		
PLANS SUBMITTED BY: <input type="checkbox"/> Architect <input type="checkbox"/> Contractor <input type="checkbox"/> Owner <input type="checkbox"/> Tenant <input type="checkbox"/> Other		
CONTACT PERSON _____	PHONE () _____	FAX () _____
WHO IS CONTACT PERSON? <input type="checkbox"/> Architect <input type="checkbox"/> Contractor <input type="checkbox"/> Owner <input type="checkbox"/> Tenant <input type="checkbox"/> Other		
OWNER INFORMATION		
OWNER _____	PHONE () _____	
ADDRESS _____	CITY _____	STATE _____ ZIP _____
CONTRACTOR INFORMATION		
COMPANY _____	PHONE () _____	
ADDRESS _____	CITY _____	STATE _____ ZIP _____
LICENSE NO. _____	CLASS _____	ARIZONA STATE TAX NO. _____
The Following Information is Required for Commercial, Industrial, and Multi-Family Projects Only		
PROPOSED USE _____	EXISTING USE _____	
PROPOSED CONSTRUCTION TYPE WALLS: <input type="checkbox"/> Combustible <input type="checkbox"/> Noncombustible	ROOF STRUCTURE: <input type="checkbox"/> Combustible <input type="checkbox"/> Noncombustible	
EXISTING CONSTRUCTION TYPE WALLS: <input type="checkbox"/> Combustible <input type="checkbox"/> Noncombustible	ROOF STRUCTURE: <input type="checkbox"/> Combustible <input type="checkbox"/> Noncombustible	
IF THIS IS AN EXISTING BUILDING, DOES IT HAVE A FIRE SPRINKLER SYSTEM? <input type="checkbox"/>		
OCCUPANCY LOAD: _____	IBC OCCUPANCY TYPE: _____	IBC CONSTRUCTION TYPE: _____
FIRE ALARM SYSTEM? _____		
UNDER PENALTY OF INTENTIONAL MISREPRESENTATION AND / OR PERJURY, I DECLARE that I have examined and / or made this application and it is true and correct to the best of my knowledge and belief. I agree to construct said improvements in compliance with all provisions of the Ordinance of the City of Phoenix, Arizona, and that the plans and specifications I have submitted for examination and approval for issuance of a permit applied for and approval of any plans in connection therewith shall not be construed to permit any construction upon said premises or use thereof in violation of any provision of the Ordinance of the City of Phoenix, Arizona, or any other ordinance or to excuse the owner or his successors in interest from complying therewith. WHERE NO WORK HAS BEEN STARTED WITHIN 180 DAYS AFTER THE ISSUANCE OF A PERMIT OR WHEN MORE THAN 180 DAYS LAPSES BETWEEN THE DATE REQUIRED FOR THE ISSUANCE OF A PERMIT AND THE DATE OF THIS DECLARATION, I hereby certify that I am the OWNER at this address or that, for the purposes of obtaining this approval, I am acting on behalf of the owner. All contract work on this project will be done by a contractor holding a valid privilege tax license and contractor's license issued by the State of Arizona and the City of Phoenix.		
APPLICANT (Please Print Name): _____ SIGNATURE: _____		
ADDRESS _____	CITY _____	STATE _____ ZIP _____
PHONE Home () _____	Office () _____	

Amount Paid: \$ _____ Date: _____ Application received by: _____

109 Permit Fees

The final permit valuation shall be set by the _____.

- a. owner
- b. building official
- c. design professional
- d. general contractor

110.1 Inspections

- Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain visible and able to be accessed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of the IBC or of other ordinances of the jurisdiction.

110.1 Required Inspections

- Footing and foundation
- Concrete slab or under-floor
- Lowest floor elevation
- Frame
- Types IV-A, IV-B and IV-C connection protection
- Lath, gypsum board and gypsum-panel product
- Weather-exposed elevated walking surfaces waterproofing
- Fire and smoke resistant penetrations
- Energy efficiency
- Others as required by the building official
- Special inspections
- Final

110.1 Required Inspections

- . Who is responsible for ensuring that the work is accessible and exposed for inspection purposes?
 - a. owner or owner's authorized agent
 - b. contractor
 - c. permit applicant or their authorized agent
 - d. design professional

110.6 Inspections

- Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the building official. The building official, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with the IBC. Any portions that do not comply shall be corrected and such portions shall not be covered or concealed until authorized by the building official.



Source: 2021 IBC

110.6 Certificate of Occupancy

- A building or structure shall not be used or occupied in whole or in part, and a change of occupancy of a building or structure or portion thereof shall not be made, until the building official has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of the IBC or of other ordinances of the jurisdiction. See the exception for work exempt from permits.

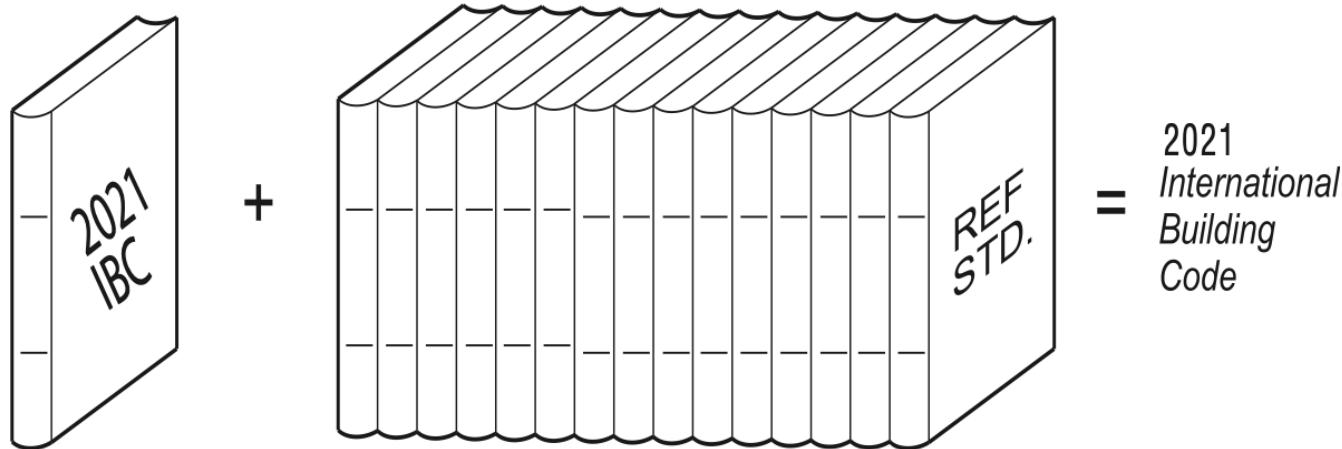
The form is titled "Certificate of Occupancy" in blue, with "(Address of Structure)" in parentheses below it. It features a yellow border with decorative corner pieces. The text inside the form states: "This [applicable portion of structure] has been inspected for compliance with the laws and ordinances of [jurisdiction] and is hereby issued a Certificate of Occupancy". Below this, there are several lines for information: "Building permit number _____", "Special conditions _____", "Applicable edition of code _____", "Use and occupancy _____", "Type of construction _____", "Design occupant load _____", "Sprinkler system required _____", "Building Official _____", and "Name and address of owner _____".

Sample of Certificate of Occupancy

Source: 2021 IBC

Chapter 35 Standards

- Chapter 35 lists the standards that are referenced in various sections of the IBC. The standards are listed herein by the promulgation agency of the standard, the standard identification, the effective date and title, and the section or sections of the IBC that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.



Chapter 35 Standards

The referenced standard dealing with accessible buildings is _____.

- a. ASME A17.1—CSA 19/CSA B44-19
- b. DOC PS 1—19
- c. ICC A117.1—17
- d. FEMA 4880—2017