



2006 International Building Code Transition from 1997 UBC: Building Envelope Issues

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1997 UBC - 2006 IBC

- Why a seminar on the 2006 IBC?
- When we are under the 2003 IBC.

- Reason: 2006 IBC may be adopted in the summer of 2008

- Might as well get ready.

1997 UBC - 2006 IBC Code Standards

- **1997 UBC**
- 74 UBC Standards identified as part of Code (Part II).
- 14 Standards adopted by reference listed in Part III.
- 143 recognized standards of Part IV considered to meet standard of duty.

- **2006 IBC**
- 500 referenced standards, such as ASTM, AWPA, AISC...
- (Commentary: *The new code and standards costs \$1200 and requires much more research by designers and contractors.*)

Architect Verification

- **1997 UBC**

- No architect duty to verify work conforms to approved plans.
- Only contractor duty to verify work conforms to approved plans and codes.

- **2006 IBC**

- No change

- (Side note: 2007 California Building Code calls for:

- Architect duty “to see that completed work conforms in every material respect to these regulations and approved plans”

- (Commentary: *This is a new world for designers.*)

(Side note: 2007 California Building Code)

- To insure completed work actually conforms to approved drawings and specifications:
- Full time general inspector(s) observes, under the direction of the architect, and reports written findings to the architect.
- Reports are filed with the building department.

Apartment Buildings – Special Height Increases (cont.)

Building heights and stories are increased for all Types

Type IIIA	Type IIIA	Type IIA	Type IIA
1997 UBC	2006 IBC	1997 UBC	2006 IBC
	Increases to:		Increases to:
4 stories	6 stories	4 stories	9 stories
65 ft.	75 ft.	65 ft.	100 ft.
Table 503	Sec. 509.5	Table 503	Sec. 509.6
R2	R2	R2	R2

Apartment Buildings – Special Height Increases

- **1997 UBC**

- No special height increases for apartment AOAO buildings.

- **2006 IBC**

- Building heights and stories are increased for Building Types
- Group R-2 (apartment buildings) height may be increased to six stories and 75 feet in Type IIIA construction
 - where first floor construction has 3 hour fire resistance rating and floor area subdivided by 2-hour fire walls into areas less than 3000 sq. ft.
- Group R-2 occupancies of IIA construction may be 9 stories and 100 feet in height where:
 - 50 feet separation to lot lines and other buildings
 - Exits segregated with 2-hour fire wall
 - First floor construction to be min. 1 ½ hour rated.

Types of Construction

- **1997 UBC Noncombustible Building Types:**

- Type I-F.R, Type II One hour, Type II-N
- 4 hour bearing wall requirements for Type I and Type II.
- 4 hour non bearing wall requirements for Type I, Type II, Type III, Type IV
- 1 hour non bearing wall requirement for Type V one hour
- 2 hour roof assembly requirements for Type I.

- (Commentary: *less fire resistance requirements.*)

- **2006 IBC Noncombustible Building Types**

- Type IA, Type IB, Type IIA, Type IIB
- 3 hour is maximum fire resistance.
- 1 ½ hour roof assembly requirement for Type I.
- No fire rating required for non bearing exterior walls.

Types of Construction (cont.)

- **1997 UBC Combustible Building Types**
- Type III One hour, Type III-N, Type IV,
- Type V One hour, Type V-N

- *Building Types are renamed*

- **2006 IBC Combustible Building Types:**
- Type IIIA, Type IIIB, Type IV, Type VA, Type VB

Penetrations

- **1997 UBC**

- Penetrations through fire-resistive horizontal assemblies shall be enclosed with approved tested assemblies.

- *(Commentary: So how is a ventilation opening put in the ceiling of Lanai or soffit or deck of a Type V one hour rated apartment building? There are no rated, tested assemblies.)*

- *(Commentary: We now have an exception that allows a penetration for ventilation.)*

- **2006 IBC**

- 712.4.1.1 Through penetrations.

-

Exceptions: ...permitted if “the openings through the assembly does not exceed 144 square inches in any 100 square feet of floor area”.

Fire Blocking

- **1997 UBC**

- No fire blocking requirement at hollow spaces of built-up units of wall architectural trim or cornices.

- (Commentary: *We have to now fire block hollow cornice spaces*)

- **2006 IBC**

- 717.2.6 Architectural trim. Fire blocking shall be installed within concealed spaces of exterior wall finish and other exterior architectural elements where permitted to be of combustible construction as specified in Section 1406 or where erected with combustible frames, at maximum intervals of 20 feet, so that there will be no open space exceeding 100 square feet. Where wood furring strips are used, they shall be of approved wood of natural decay resistance or preservative-treated wood. If noncontinuous, such elements shall have closed ends, with at least 4 inches of separation between sections.

Ventilation Requirement is Reduced

- **1997 UBC**
- Wire mesh at under-floor vent openings to be $\frac{1}{4}$ inches square.
- Natural ventilation for occupied space based on 10 percent floor area (operable windows).
- Attic access opening to be minimum 22 x 30 inches.
- **2006 IBC**
- Wire mesh at under-floor vent openings to be least dimension less/equal $\frac{1}{4}$ inches
- Natural ventilation for occupied space at 4 percent of floor area
- Attic access opening to be minimum 20 x 30 inches

Construction in Flood Areas

- **1997 UBC**
- No special requirement for construction in flood areas.

- **2006 IBC**
- 1403.5 Flood resistance. For buildings in flood hazard areas as established in Section 1612.3, exterior walls extending below the design flood elevation shall be resistant to water damage. Wood shall be pressure-preservative treated

Window Sill Height is more Child Resistant

- **1997 UBC**

- Escape operable window sill shall be a max of 44 inches above the interior floor.

- (Commentary: *No restriction on minimum operable window sill ht.*)

- (Commentary: *Residential window heights are now more “childproof” 24” minimum. It is more difficult for them to fall out.*)

- **2006 IBC**

- 1405.12.2 Window sills. In Occupancy Groups R-2 and R-3, one- and two-family and multiple-family dwellings, where the opening of the sill portion of an operable window is located more than 72 inches (1829 mm) above the finished grade or other surface below, the lowest part of the clear opening of the window shall be a minimum of 24 inches above the finished floor surface of the room in which the window is located. Glazing between the floor and height of 24 inches shall be fixed or have openings such that a 4-inch diameter sphere cannot pass through.

- (there is a minor exception)

Mineral Wool – Fire Blocking

- **1997 UBC**

- Mineral wool is not an approved fire block without an approved fire rated sealant.
- *(Commentary: At furred rainscreen walls, fire blocking is required. But mineral wool may be used as the fire blocking and still maintain vapor movement.)*

- **2006 IBC**

- 717.2.1 Fireblocking materials
- Mineral wool may be used as fireblocking, thus mineral wool may be used in the below condition.
- 1406.2.4 Fireblocking. Where the combustible exterior wall covering is furred from the wall and forms a solid surface, the distance between the back of the covering and the wall shall not exceed 1.625 inches and the space thereby created shall be fireblocked in accordance with Section 717.

Weather Resistant Barriers

- **1997 UBC**
- **1402.1 Weather-resistive Barriers.** All weather-exposed surfaces shall have a weather-resistive barrier to protect the interior wall covering. Such barrier shall be equal to that provided for in UBC Standard 14-1 for kraft waterproof building paper or asphalt-saturated rag felt. Building paper and felt shall be free from holes and breaks other than those created by fasteners and construction system due to attaching of the building paper, and shall be applied over studs or sheathing of all exterior walls.
- (Commentary: *“Weather-resistive” has never meant “waterproofing”. The new IBC is trying to get a little closer to “waterproofing”.*)
- **2006 IBC**
- *See next slide.*

Weather Resistant Barriers (cont.)

- **2006 IBC**
- 1403.2 Weather protection. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. **The exterior wall envelope shall include flashing**, as described in Section 1405.3. The exterior wall envelope shall be designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior barrier behind the exterior veneer, as described in Section 1404.2, **and a means for draining water that enters the assembly to the exterior.**
- *(Commentary: DEFS would not be permitted. EIFS systems would require drainage plane.)*

Flashings / Counter-flashings

- **1997 UBC**

- 1402.2 Flashing and Counterflashing. Exterior openings exposed to the weather shall be flashed in such a manner as to make them weatherproof.
- *(Commentary: “Flashing” is not required to be metal.)*
- All parapets shall be provided with coping of approved materials. All flashing, counterflashing and coping, when of metal, shall (be ... 26 gage galvanized sheet metal gage) corrosion-resistant metal.

- **2006 IBC**

- *See next slide*

Flashings / Counterflashings (cont.)

- **2006 IBC**

- *(Commentary: IBC calls for metal flashing at all material transitions. Saddle flashing at all building intersections is now mandatory.)*

- 1405.3 Flashing. Flashing shall be installed in such a manner so as to prevent moisture from entering the wall or to redirect it to the exterior. Flashing shall be installed at the perimeters of exterior wall assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimneys, porches, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashing with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim.

Balconies & Similar Projections

- **1997 UBC**

- Balcony (lanai) construction shall maintain the fire rating of the floor and wall assemblies of the building type.

- **2006 IBC**

- 1406.3 Exceptions:

- On buildings of Type I and II construction, three stories or less in height, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
- Untreated wood is permitted for pickets and rails or similar guardrail devices that are limited to 42 inches (1067 mm) in height.
- Balconies and similar projections on buildings of Type III, IV and V construction shall be permitted to be of Type V construction, and shall not be required to have a fire-resistance rating where sprinkler protection is extended to these areas.

Exterior Wall Siding Fastening for Wind

- **1997 UBC**

- No requirements for fiber cement or MCM (metal composite material) siding.
- Vinyl siding shall be installed in accordance with manufacturer's instructions.

- **2006 IBC**

- 1405.13 Vinyl siding. Increased fastening requirements due to wind speed and follow manufacturer's instructions.
- 1405.15 Fiber cement siding. Increased fastening requirements due to wind speed and follow manufacturer's instructions.
- 1407.6 MCM systems shall ... be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's installation instructions.

Roof Drains & Overflow Drains

- **1997 UBC**
- Roof drains and overflow drains design in Section 1506.
- Roof Class type selection from Table 15-A

- **2006 IBC**
- Roof drains and overflow drains design in International Plumbing Code.
- Roof Class type selection from Table 1505.1 (*next slide*)

Roof Assemblies and Rooftop Structures

- **1997 UBC**

- Follow manufacturer's written instructions.

- *(Commentary: More flashing, saddle flashing and flashing joint requirements.)*

- **2006 IBC**

- 1503.2 Flashing. Flashing shall be installed in such a manner so as to prevent moisture entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.
- ***(Also, follow manufacturer's written instructions)***

Asphalt Shingles

- **1997 UBC**
- 1507.5 Asphalt Shingles. Asphalt shingles shall be fastened according to the manufacturer's instructions and Table 15B-1.

- **2006 IBC**
- *(Commentary: Rated Roofs are required to resist blow off in high winds.)*
- 1504.1.1 Wind resistance of asphalt shingles..... For roofs located where the basic wind speed ... is 100 mph or greater, asphalt shingles shall be tested in accordance with ASTM D 3161, Class F. ...
- *(continued)*

Asphalt Shingles (cont.)

- Asphalt shingles shall have self-seal strips or be interlocking and comply with ASTM D 225 or ASTM D 3462.
- 1507.2.7 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer and Section 1504.1. Asphalt shingles shall be secured to the roof with not less than four fasteners per strip shingle or two fasteners per individual shingle....

Ballasted Low-Slope Roof Systems

- **1997 UBC**
- Follow manufacturer's instructions

- **2006 IBC**
- *(Commentary: Greater blow off resistance requirements)*
- 1504.4 Ballasted low-slope roof systems. Ballasted low-slope (roof slope < 2:12) single-ply roof system coverings installed in accordance with Section 1507 shall be designed in accordance with Section 1504.8 and ANSI/SPRI RP-4.

Edge Securement for Low-slope SP Roofs

- **1997 UBC**
- Follow manufacturer's instructions

- **2006 IBC**
- *(Commentary: Increased fastener requirements.)*
- 1504.5 Edge securement for low-slope roofs. Low-slope membrane roof system metal edge securement, except gutters, shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609.

Impact Resistance

- **1997 UBC**
- Follow manufacturer's instructions.

- **2006 IBC**
- *(Commentary: more impact resistance)*
- 1504.7 Impact resistance. Roof coverings installed on low-slope roofs (roof slope <math><2:12</math>) in accordance with Section 1507 shall resist impact damage based on the results of tests conducted in accordance with ASTM D 3746, ASTM D 4272, CGSB 37-GP -52M or the "Resistance to Foot Traffic Test" in Section 5.5 of FM 4470.

Underlayment For Shingle Roof

- **1997 UBC**

- Asphalt Shingle Underlayment per Table 15-B-1
- *(Commentary: No language on underlayment distortions)*

- **2006 IBC**

- *(Commentary: No distortions of underlayment)*
- **1507.2.8 Asphalt (Shingle) Underlayment application.** For roof slopes from two units vertical in 12 units horizontal (17-percent slope) and up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a minimum 19-inch wide strip of underlayment felt parallel with and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch wide sheets of underlayment overlapping successive sheets 19 inches, by fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied in shingle fashion, parallel to and starting from the eave and lapped 2 inches, fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the shingles to seal.

Gravel and Stone

- **1997 UBC**
- Follow manufacturer's instructions.

- **2006 IBC**
- *(Commentary: More restrictions on use of gravel ballast and surfacing.)*

- 1504.8 Gravel and stone. Gravel or stone shall not be used on the roof of a building located in a hurricane-prone region as defined in Section 1609.2, or on any other building with a mean roof height exceeding that permitted by Table 1504.8 based on the exposure category and basic wind speed at the building site.

Gravel and Stone (cont.)

- Table 1504.8 MAXIMUM ALLOWABLE MEAN ROOF HEIGHT PERMITTED FOR BUILDINGS WITH GRAVEL OR STONE ON THE ROOF IN AREAS OUTSIDE A HURRICANE-PRONE REGION
- *(Commentary: More restrictions on use of gravel depending on the height of building and location.)*

Basic Wind Speed From Figure 1609 (mph)**	Maximum Mean Roof Height (ft) *,***		
	Exposure Category		
	B	C	D
85	170	60	30
90	110	35	15
95	75	20	NP
100	55	15	NP
105	40	NP	NP
110	30	NP	NP
115	20	NP	NP
120	15	NP	NP
Greater than 120	NP	NP	NP

Cricket and Saddles

- **1997 UBC**
- No cricket requirement.

- **2006 IBC**
- 1507.2.9.4 Crickets and saddles. A cricket or saddle shall be installed on the ridge side of any chimney or penetration greater than 30 inches wide as measured perpendicular to the slope. Cricket or saddle coverings shall be sheet metal or of the same material as the roof covering.

Roof Vertical Surfaces

- **1997 UBC**

- Follow manufacturer's written instructions.

- **2006 IBC**

- *(Commentary: By requiring counterflashing, the IBC is making future reroofing more accessible.)*
- 1507.3.9 Flashing. At the juncture of the roof vertical surfaces, flashing and counterflashing shall be provided in accordance with the manufacturer's installation instructions, where there is a possibility of ice forming along the eaves causing a backup of water, the metal valley flashing underlayment for slopes under seven units vertical in 12 units horizontal (58-percent slope) or self-adhering polymer-modified bitumen sheet shall be installed.

Exterior Windows and Doors

- **1997 UBC**
- No weather resistance testing required

- **2006 IBC**
- *(Commentary: Lots of testing)*
- 1714.5.1 Exterior windows and doors. Exterior windows and sliding doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/ I.S.2/A440. The label shall state the name of the manufacturer, the approved labeling agency and the product designation as specified in AAMA/WDMA/ CSA101/I.S.2/A440. Exterior side hinged doors shall be tested and labeled as conforming to AAMA/ WDMA/CSA101/I.S.2/A440 or comply with Section 1714.5.2. Products tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440
- Or see next slide.

Exterior Windows and Doors (cont.)

- Alternative test:
- 1714.5.2 Exterior windows and door assemblies not provided for in Section 1714.5.1. Exterior window and door assemblies shall be tested in accordance with ASTM E 330. Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1.5 times the design pressure.

Cement Plaster

- **1997 UBC**

- Section 2506.4 Two layers of Grade D paper required over wood sheathing.
- 1402.1 “Exterior opening exposed to the weather shall be flashed in such a manner as to make them weatherproof.”

- **2006 IBC**

- Section 2510.6 As one of the two layers, a plastic vapor-permeable barrier (such as Tyvek or a drainage panel such as Delta Dry) may be used. Furred rainscreen vent space may also count for one layer of underlayment.

Cement Plaster (cont.)

- **2006 IBC**
- Design weather exposed cement plaster per ASTM C926-98a:
 - ASTM C926
 - A2.1.2 ... Flashing shall be specified at openings, perimeters, and terminations... Flashing material shall be corrosion-resistant material.
 - A2.1.3 Sealing or caulking of V-grooves, exposed ends, and edges of plaster panels exterior work to prevent entry of water shall be provided.
 - *(Commentary: The previous C926-89 required V grooves to be troweled into the brown coat around window and door openings. The current C926-98 only requires V grooves at interior wall openings.)*

Gypsum Sheathing

- **1997 UBC**
- *Section 2512 “Green board ” water resistant gypsum may be used in showers and water closets.*
- **2006 IBC**
- “Green board may not be used behind showers or water closets.” Only inorganic materials, such as *Dens Gold*™ or Cement board, may be used.
- *(Commentary: Green board can still be used at exterior soffits, but we don’t recommend it.*

Conclusion

1. Some liberalization of fire resistance requirements
2. Increased height allowances
3. Increased waterproofing, flashing and saddle flashing, flashing joint requirements
4. Increased roof wind resistance requirements