

Recommendations & Commentary

[Updated September 11, 2003]

COMMITTEE MEMBERS:

1. Jack Aiello, City of San Carlos
2. Howard Bell, City of Monte Sereno
3. Fred Cullum, City of Burlingame
4. Brent Hipsher, Town of Portola Valley
5. Neil Rains, City of Milpitas
6. Ken Thurman, City of San Jose (Chairman)

LEGEND:

- Text in **green** is committee commentary and rationale for recommendations.
- AHJ = authority having jurisdiction (*the local building enforcement agency*)

I. ESTABLISHMENT OF BASEMENT COMMITTEE –

At the joint East Bay and Peninsula ICC chapter meeting held on January 8, 2003, the subject of basements was raised during the open forum portion of the meeting. Questions were raised such as:

- *What constitutes a residential basement?*
- *Is there a difference between a large under-floor area and a basement?*
- *What is the minimum ceiling height in a basement?*
- *Can a basement be used for a home theatre without meeting the natural light requirements per code?*
- *Does every basement require emergency egress?*
- *What provisions of the code are applicable to basements?*

There were many opinions expressed by those in attendance but it was evident that there was little consensus. Due to having a full agenda, the subject was tabled for future discussions. At the subsequent Tri-chapter code interpretation meeting on January 14, 2003, it was determined that a committee should be formed to address the basement issues raised at the joint East Bay and Peninsula ICC meeting and to propose recommendations for a regional policy. This document is the result of that effort.

II. BASIS FOR COMMITTEE RECOMMENDATIONS –

The committee reviewed applicable code sections from the 2000 IRC, 2003 IBC, and the NFPA 5000 as a basis for discussion and comparison to the 2001 CBC requirements. The committee also deliberated on other related issues and reviewed relevant topics from two code discussion chat groups, specifically, the Building Codes Discussion Group (BCDG) and the ICBO chat groups. **The committee concluded that it would be best to develop regional guidelines based on the existing state-adopted building code (2001 CBC) and when California adopts a different code, then the basement guidelines can be modified, as necessary, to achieve consistency with the new code.** The committee further recommends submission of Tri-Chapter adopted basement provisions to the CBC/ICC as a code change.

III. PROPOSED DEFINITIONS –

As the committee began discussions on the topic, it became apparent that we needed to differentiate between a basement and an under-floor area. After doing this, the committee was then able to adequately separate out the issues that pertained to each. The committee proposed to add a modifier to the definition of "basement" as defined in the CBC. The committee also proposed to define "under-floor area" (UFA), which is not presently defined in the CBC.

- A) Proposed **modified** definition of **“Basement”** - Basement is any floor level below the first story in a building, except that a floor level in a building having only one floor level shall be classified as a basement unless such floor level qualifies as a first story. **Basement is differentiated from “under-floor area.”**

(The CBC definition of basement is in regular text – the **bolded** text is the proposed modifier)

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- B) **Proposed Tri-chapter definition of “Under-floor area (UFA)”** - Under-floor area is the space below the first story in a dwelling that has a ceiling height less than 7' 0", measured from the floor surface to the bottom of the floor joists above.

Exception 1: A space below the first story in a dwelling having a ceiling height greater than 7' 0" may be considered an UFA when the natural grade in the under-floor space slopes more than two percent due to hillside topography. In these cases, the area may be considered an UFA due to its non-usability features of not having a level floor surface.

Note 1: Once a sloped UFA (or portion of such area) is excavated to achieve a ceiling height of 7'0" minimum and the space contains a relatively level floor surface (< 2%), then the space will be considered a basement.

Note 2: Under-floor area is also commonly referred to as “*crawl space*”, which is a common term for this area, especially when the headroom height is very low and navigating through the space requires bending, scooting, or crawling.

IV. ALLOWED USES –

- A) **Basements** may be used for habitable or non-habitable use and must comply with **all** applicable CBC code requirements. For example: headroom clearances - per sec. 310.6.1; light & ventilation requirements - per sec. 1203; exiting - per Chapter 10; emergency escape and rescue - per sec. 310.4.

- B) **Under-floor areas** are considered restricted-use areas and **may only be used for the placement of permanently installed equipment that services the dwelling** (i.e. HVAC equipment).

Note 1: Equipment areas must have access for servicing as required by code.

Note 2: Plumbing fixtures are not allowed in an UFA except for fixtures that specifically relate to permanently installed equipment serving the dwelling.

Note 3: UFAs may **not** be used for any living purposes, including sleeping rooms, offices, cooking, bathrooms, laundry rooms, workshops, entertainment rooms, and other similar uses.

Note 4: The UFA is not allowed to be conditioned space.

Note 5: The under-floor shall have outside ventilation per CBC (1 sq. ft./150 sq. ft. of floor area).

General note for basements & UFAs:

When a basement or UFA is **not** intended to be habitable space per CBC definition, then the space cannot be finished to look as if it were going to be used as habitable space. Therefore, in other than habitable space areas, electrical receptacles and lighting outlets are limited in such areas at the discretion of the authority having jurisdiction (AHJ). For example, lighting in such non-habitable spaces could be limited to minor general lighting for the space and for service lighting at permanently installed HVAC equipment.

V. ACCESS & EXITS –

- A) **Basement Access** – Stairways and ramps providing access to a basement shall be in compliance with the CBC.

Note 1: Some jurisdictions require basements to have integral access through the house per local zoning regulations.

- B) **Under-floor Access** – is required by CBC sec. 2306.3. The under-floor access opening shall be 18" x 24" minimum. However, if there is equipment in the UFA, the access opening shall be sized to allow removal of the largest piece of equipment, but in no case shall the access opening be less than 22" x 30".

Note 1: If desired, an UFA may have access by ladder, stairway, or ramp.

Note 2: Stairways and ramps providing access and egress to basements and UFAs shall be in compliance with the CBC.

- C) **Basement Exits** – Basements shall have at least one code complying **exit**. The exit shall be either through the house or directly to the outside by way of a door.

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Two exits are required in basements as follows:

1. In basements 3,000 square feet or larger per CBC Table 10-A (*based on an occupant load factor of 300 for dwellings*) OR
2. Where there is **fixed** seating of 10 or more (i.e. - *home theaters*) OR
3. On every basement level below the first basement level (in *multi-level basements*)

Note 1: When two exits are required, at least one of the two exits on each level shall communicate directly to the outside.

Some jurisdictions are now seeing plan submittals for basements more than one level down (multi-level basements). Due to the high cost of land values and diminishing land resources in our area, it is likely that locales will continue to see more proposals for multi-level basements in the future. It is questioned that the code envisioned multi-level basements for dwelling units. In light of the code not specifically addressing multi-level basements in dwellings, the committee felt it was prudent to address this situation and has made its recommendation for exiting from multi-level basements as stipulated in item #3 above.

D) **Under-floor Exits** – UFAs are not required to have code-complying exits - exiting from such spaces can be through the access opening (*as stipulated in item B above*).

VI. EMERGENCY ESCAPE or RESCUE –

A) **Basements** - CBC sec. 310.4 stipulates that **all basements and every sleeping room below the fourth story** shall be provided with a means of emergency escape or rescue.

Exception: If a basement is not of sufficient size to reasonably accommodate potential sleeping conditions, emergency egress and escape from the basement may be waived by the Building Official. The Building Official may waive the emergency egress requirement in a basement if the "**usable**" space in the basement is less than 70 square feet.

Note 1: The space required for stairways, landings, permanent appliances and equipment that service the dwelling and the working space required to service said equipment, shall not be considered as usable space.

B) **Under-floor Area** – emergency escape or rescue is not required from an UFA.

If the code were strictly enforced with regards to emergency escape in basements, then emergency escape or rescue would be required from every single basement (regardless of size or use). The reality is, most (if not all) existing utility basements do not have emergency escape provisions. The committee unanimously agreed that it did not seem reasonable to start to require emergency escape in such cases. However, the committee recognized a two-fold problem. First, the literal code language requires emergency escape in (ALL) basements. Secondly, if one was going to approve a utility basement without providing emergency escape, then where does one draw the line with other situations? For example, could emergency escape or rescue also be exempted in the following situations?

1. For a washer and dryer in the basement
2. For storage space only in the basement
3. For a bathroom in a small basement
4. For a home theatre use in a basement
5. For a wine cellar, etc.

It is quite common for a basement to go through several adaptations throughout the life of a home. For example, a new owner could easily convert a 700 square foot wine cellar to a home theatre, family room, or series of bedrooms. Emergency escape or rescue may not have been a serious life-safety concern when the use of a basement was a wine cellar, but the life-safety concern becomes more apparent when the use of the space is converted into a sleeping room or other habitable use. It should also be noted that many basement "storage areas" are convenient places for some people to illegally convert to granny quarters or to otherwise use for sleeping purposes for guests or for sleep over events for children.

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The CBC Handbook clarifies why the emergency escape or rescue requirement is mandated for basements. It states, "...The reason for the (emergency escape) requirement in basements is that they are so often used as sleeping rooms." Due to the fact that basements are often used for sleeping rooms, the code is clear that all basements must have provisions for emergency escape or rescue. Again, it is important to realize that this code requirement is mandated in ALL basements, regardless of the size or use of a basement and whether or not there are any sleeping rooms in a basement.

The committee felt strict adherence to this code was overly restrictive for certain small basement uses, where such basements could not reasonably accommodate sleeping conditions. Therefore, the committee proposed the above exception, which would essentially allow for a small basement to be used for storage and/or for the placement of appliances/equipment, which serves the dwelling, without having to provide emergency escape or rescue, at the discretion of the Building Official.

VII. EXTERIOR EXIT & EMERGENCY ESCAPE

Can a door to the outside satisfy both the exiting & emergency egress requirements?

The following scenario was posed to ICC:

GIVEN:

Area is a basement by definition; No sleeping rooms are in the basement; One complying door exists directly to the exterior; No internal stairway

QUESTION:

Is it the intent of Section 310.4 of the 2001 CBC to require emergency egress and rescue windows/doors in addition to the exit required under Section 1004.2.3.2?

ICC's opinion (burgundy text**) stated, "An exterior door from the basement would satisfy the emergency escape or rescue opening requirement and exit requirement. Consider the following case and then apply it to the basement case:*

A typical bedroom at grade almost always has a door to a hallway and exterior window. But if someone wanted to build a detached bedroom what would be required besides an exterior door. The door would meet the exit requirements of Chapter 10 and emergency escape or rescue requirements of Section 310.4. In other words, this one opening meets both requirements. Therefore, when applying this bedroom scenario to the questions related to the basement, the same arguments can be made. Typically, you would have both the interior door plus an emergency access window or as required by code an exterior door with a basement window. Although the window may not satisfy the emergency provisions, it is reasonable to encourage the owner to provide the extra opening based on the life-safety concerns."

The committee voted to support ICC's opinion. Only one way out of a basement is required if there is a code complying exit directly to the outside and no sleeping rooms are in the basement.

VIII. SEPARATION OF EXIT & EMERGENCY ESCAPE –

The following question was posed to ICC by the committee - "Assuming there are two ways out of a basement, should the exits be placed a "reasonable" distance apart? For example, assume a 2,999 square feet basement with a stairway to the house at one end of the basement (primary exit) and there is one emergency egress window (secondary exit) required. The applicant is proposing to install the emergency egress window right next to the stairway. This would place all of the exiting at the same place in the basement. From a life-safety standpoint, it would make sense to place these exits as far apart as possible, however, I cannot find any specific requirement for this in the code. The only similar application I see in the code regarding distance to exits is when two exits are required from a room.

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In these cases, the required exits must be separated by at least half the diagonal of the room. I think one can similarly argue that this would also make sense in a basement and, the authority having jurisdiction could require someone to separate the required exit from the emergency escape window or door. Due to the unique nature of a basement with its limited options of exiting, it would seem prudent to require that the exits from a basement be reasonably separated to allow for exiting from different locations, preferably at each end of the basement. This would reduce the chances of someone being trapped in the event of a fire or other emergency.”

**ICC’s response - “As stated in your question, there are no specific code provisions that would require separation between the exit and the emergency escape or rescue exterior opening required in Section 310.4. However, it makes sense, whenever possible, that the designer and/or owner be encouraged to provide exit separation resulting from the life-safety concern.”*

The code does not specifically address the scenario regarding distance separation of a single exit from an emergency escape in a basement. However, as it makes sense to do so, the committee is recommending that the means of egress in a basement be separated as much as is *practicable*.

IX. LIGHT WELL DIMENSIONS –

Basements are notoriously dark and bringing sufficient natural light to them can be challenging. This issue becomes more problematic with deep light wells. We are seeing more basements on hillside lots, and in some cases, light wells are exceeding depths of 25 feet making the task of providing natural light even more difficult. The AHJ might want to consider modifying these guidelines for deep light wells (> 12’ 0”). It may be appropriate to increase the grade level opening dimensions to bring in sufficient lighting in deep well situations.

In order to bring adequate natural light to the basement, the committee is recommending the following sizing criteria for shallow light wells:

The **width** of a light well shall not be less than 30 inches in width (*the distance out from the house*) per CBC Section 1204.

The **length** of a light well shall not be less than the length of the window it serves.

Window well openings must equal or exceed the aggregate window opening size at **grade level**, but shall not be less than the minimums specified in the code.

Example 1 - A 12’ x 10’ playroom is located in the basement and requires 12 square feet of natural light. In addition to a 12 square foot window in the basement wall, the open and unobstructed area of the light well at grade level must equal or exceed 12 square feet (30” wide x 4’ 9 1/2” long).

Example 2 - An 8’ x 10’ bedroom is located adjacent to the room described in Example 1. The design includes one light well to serve both rooms. The minimum required open area at grade level is 12 square foot (EX. 1) + 8 square foot (EX. 2) for a total of 20 square feet. The minimum size of the light well in this example is 36” wide (*min. emergency escape or rescue requirement*) x 6’ 8” long.

Emergency escape or rescue window well dimensions –

CBC sec. 310.4 states, “*The clear horizontal dimensions shall allow the window to be fully opened and provide a minimum accessible net clear opening of 9 square feet, with a minimum dimension of 36 inches.*”

Projections in light/window wells are not allowed (*excluding ladders/landings*) where such projections restrict required natural light and/or impede emergency escape or rescue. Projections above the light/window well must provide a minimum overhead clearance of 7’0” measured from grade level. The encroachment of ladders/landings must be considered in the natural light calculation and the window well must be sized accordingly.

X. GUARDRAILS –

Guardrails are required at light wells/window wells when the depth of a well exceeds (30) thirty inches at any point. Guardrails shall be constructed in conjunction with CBC sec. 509. For example, the top of guardrails shall not be less than 36 inches in height; open guardrails shall have intermediate rails or an ornamental pattern such that a sphere 4 inches in diameter cannot pass through. *The committee felt that guardrails should be required at light wells because of the life-safety concerns of someone falling into an unprotected well.*

XI. LADDER REQUIREMENTS in WINDOW WELLS –

Ladders are required in all emergency escape and rescue window wells where the depth of the window well exceeds 44 inches, measured from the standing surface of the well to the finished grade. *The following specifications are a compilation of CBC (sec. 310.4) & CMC (sec. 910.8) ladder requirements with some minor committee modifications (blue text).*

1. Ladders shall be permanently affixed.
2. Ladders shall extend from the floor surface of the window well to the finished grade.
3. Ladders shall be accessible with the window in the fully open position.
4. Ladders shall not encroach into the required dimensions of the window well by more than (6) six inches.
5. Ladders shall be at least (14) fourteen inches in width.
6. The first rung shall not exceed (14) fourteen inches above the standing surface of the window well.
7. The rungs shall be uniformly spaced and shall not exceed (14) fourteen inches on center spacing with a 3/8" maximum tolerance for the entire length of the ladder.
8. The minimum toe space shall be (6) six inches.
9. Landings shall be incorporated into the ladder design when a window well exceeds twelve feet in height.
 - 9.1 The first landing shall be no higher than (12) twelve feet from the standing surface of the window well to the top of the landing.
 - 9.2 For window wells deeper than 12'0" but less than 24'0", the landing shall be installed at the midway point of the well.
 - 9.3 Landings shall not be more than (12) twelve feet apart.
 - 9.4 Landings shall be (9) nine square feet (min.) with no dimension less than 36 inches.
 - 9.5 Ladders and landings shall be designed to support a minimum of 500 pounds.
10. Ladders/landings shall be constructed of materials that are suitable for exterior use.

Some cities have reported having multi-level basements and/or deep single-level basements with ceiling heights of 14 feet and greater. One city reported having a situation where the depth of a window well exceeded 25 feet due to hillside topography. This raised some concerns about using ladders from window wells for the purposes of emergency escape and rescue. The committee felt that if a ladder was going to be used in a deep window well for emergency escape or rescue then the ladder design should also have landings if the window well exceeded 12' 0" in height.

The building code requires landings for stairs at every 12' 0" of vertical rise and it was felt that ladders, serving as a means of egress from a window well, should be given similar consideration for landings as is given to stairways. A ladder landing would allow a person escaping a building a chance to catch their breath on ascension and it could also serve as a staging platform for a firefighter when assisting people from a deep window well. The reason for the 500-pound design criteria was due to the plausibility of two people climbing an escape ladder at the same time. For example, if a fireman was helping a person climb out of a window well, it was felt that the ladder should support both people (500 lbs. seemed to be a reasonable figure).

XII. DRAINAGE FROM LIGHT/WINDOW WELLS –

The CPC sec. 306.2 states, “...*light wells or similar areas having rain water drain, shall discharge to the outside of the building....*” The code language is vague regarding how to drain water from a light well. The committee is proposing the following drainage guidelines:

1. Light wells subject to rainwater collection shall be designed to discharge by gravity into drywells or leach fields or by mechanical means such as with lift stations or sump pumps.
2. The floors of window wells shall be sloped to an approved drain or sump.
3. When sump pumps are used, piping materials and installation methods shall be in compliance with the California Plumbing Code (CPC).
4. Pumped drainage systems shall discharge to the outside of the building in an approved manner to the AHJ. Pumped water shall not drain onto adjoining properties.
5. Consideration should be given to removing collected water in such a manner as to keep water away from any structures and to not cause topsoil erosion.

XIII. SECURITY BARS, GRILLES, GRATES & COVERS –

These may be used for security purposes and/or for keeping water out of the window well and may be used in lieu of guardrails provided:

1. Covers & security devices over emergency escape window wells are easily operable from the inside of the well without the use of special knowledge, tools or keys and, when required by the AHJ, an opening assisting device (*such as spring loading*) shall be employed.
2. The owner maintains efficient and smooth operation of all such removable covers and security devices to insure their reliable operation for the life of the cover or device.
3. Covers & security devices shall be designed to support actual and/or anticipated loads. For example, covers and devices which are accessible to foot traffic and contain “*standing surfaces*”, shall be designed to withstand 40 lbs. per sq. ft. (min.).
4. When a cover or security device is utilized at an emergency escape or rescue well, a permanent sign, as approved by the AHJ, shall be affixed to the home adjacent to the well stating, “EMERGENCY ESCAPE & RESCUE WELL – DO NOT BLOCK.”
5. The minimum clear opening at grade level for window wells used for emergency escape or rescue shall be (9) nine square feet with a minimum dimension of 36 inches.
6. When a cover or security grille is used at emergency escape and rescue window wells, it may not be apparent to a person looking up at the cover or device that they can readily exit the window well in an emergency. Therefore, a permanent sign, as approved by the AHJ, shall be affixed to the wall adjacent to such windows stating, “EMERGENCY EXIT.”

MISCELLANEOUS ITEMS DISCUSSED IN COMMITTEE –

XIV. PRE-FABRICATED WINDOW WELLS –

There are several manufacturers who are making pre-fabricated window wells, however, the committee is not aware of any performance standards or E.R. Reports for such products, therefore, proposals to accept these products should be carefully evaluated. The AHJ can approve these products under the *Alternate Materials and Methods of Construction* provisions in the CBC, sec. 104.2.8; however, the AHJ should document its acceptance criteria in lieu of product evaluation and acceptance by a *Nationally Recognized Testing Laboratory* (NRTL).

XV. GLAZING in WINDOW WELLS –

The following question was discussed, “*Should glazing in emergency escape window wells be safety glazing because of the additional risk associated with falling from a ladder in these types of escape wells?*” The majority felt it would not be necessary to expound upon the safety glazing requirements as stipulated in the CBC.

XVI. NATURAL LIGHT SCENARIO –

An applicant proposing to build an 800 sq. ft. home theatre in a basement did not want any windows because he wanted the basement to be dark. The designer was proposing to use CBC sec. 1203.1 to get out of providing windows in the basement. This code section states, “*For the purpose of determining the light or ventilation for Group R Occupancies required by this section, any room may be considered as a portion of an adjoining room when one half of the area of the common wall is open and unobstructed and provides an opening of not less than one tenth of the floor area of the interior room or 25 square feet, whichever is greater.*” The advantage of using this code section in a basement application is that openings in the floor of the first story, as well as skylights, could provide natural light to the basement without having to provide windows in the basement. See the hypothetical example below for some possible scenarios.

EXAMPLE: SFD - 1,200 sq. ft basement - first story is 1,000 sq. ft.

The natural light required for the basement is 120 sq. ft. (10% of floor area)

The natural light required for the first floor is 100 sq. ft. (10% of floor area)

The total light required for both floors combined is 220 sq. ft. (10% of combined floor area)

Case #1 - 100% of the natural light for the basement could come from roof skylights with clear unobstructed openings of the combined skylights totaling 120 sq. ft. and extending all the way from the roof to the basement with no reduction in shaft size OR

Case #2 - 100% of the natural light for the basement could come from 220 sq. ft. of window openings in the first story with adequate floor openings into the basement below. However, the AHJ would have to determine how much of the first story floor would have to remain open as there is no common wall in this scenario. The assumption with this code section is that an “*adjoining room*” is presumed to be on the same floor level as the room it adjoins to. **The consensus of the committee was that this scenario could possibly be acceptable to the AHJ under the *Alternate Methods and Materials of Construction*.**

Note 1: Bringing light from the floor above or through skylights does not eliminate the requirement for emergency escape or rescue provisions as previously specified in this document.

XVII. EXISTING BASEMENT SCENARIO –

An existing basement with an under-floor access opening through the first floor of the house (*no existing stairway*) - A homeowner submits plans to put in a new staircase to his existing basement. Does this alteration require the owner to install emergency escape from the basement?

Committee response:

Yes. A new stairway provides greater accessibility and use of the existing basement, thereby, making the occupancy more hazardous than its pre-existing condition. In this circumstance, the requirement for emergency escape or rescue in the basement would be required, assuming that the basement had 70 square feet or more of usable space.

Note 1: If the stairway were a replacement of an existing stairway, then emergency escape would not be required as there is no increased hazard.

XVIII. FLOOR SURFACE –

The Committee deliberated whether we should address the "*floor surface*" in the under-floor area definition. It was widely felt that there should be no finished flooring in UFAs. However, there was some discussion as to whether a "*ratproofing slab*" would qualify as a "*finished floor*." The ratproofing slab is typically a concrete slurry poured throughout the UFA to prevent rodent infestation. The ratproofing barrier is normally a thin slab (*approx. 2" thick*) with a relatively rough (*unfinished*) surface. However, it was pointed out that some people actually ratproof their UFAs with a more finished type slab. Some people are reportedly pouring a regular 4" thick slab, complete with troweled finish. For all practical purposes you would never know to differentiate between these so-called ratproof slabs and a regular, good old-fashioned floor slab. The Committee decided to not address flooring in UFAs due to the complexities of having to prohibit all types of flooring, yet somehow allowing for a ratproof slab, which could, very realistically, look exactly like a regular floor slab.