Technical Advisory Committee Meeting Notes

Project: DWR Task Order 107 – SB5 Building Code Standards

Date and Time: August 28, 2008, 8:00 AM **Location:** DWR Offices

Attendees

Lisa Beutler	CCP	Steve Bradley	DWR
Dan Fua	DWR	Ken Giberson	MacKay&Somps
Leslie Haberek	ICC	Pal Hegedus	FMA
Shawn Huff	HCD	Ken Kirby	DWR/KCG
Roger Lee	DWR	Edie Lohmann	NFIP
Maria Lorenzo-Lee	DWR	Nathan Lyday	DWR
Roger Peterson	MWH	Ricardo Pineda	DWR
Rebecca Quinn	RCQuinn	Ann Redington	PBS&J
Kevin Reinerton	SFM	Fred Schott	SEAOC
Howard "Chip" Smith	DSA	Jane Taylor	BSC
Brian Walker	DWR	Emily Withers	HCD
Gary Yagade	PBS&J		

Welcome and Introductions

DWR's FloodSAFE Program Overview
Ken Kirby provided an overview of the FloodSAFE goals and objectives as background for the TAC members. Additional information for the program may be located at www.water.ca.gov/floodsafe.

Role of TAC Members & Meeting 1 Goals

- Provide DWR with Technical and Policy recommendations related to Building Code standards in relation to SB 5 criteria.
- Represent respective agency or group in the SB 5 Building Code project and discuss key points that are important to organization.
- Participate in an integrated and multi-objective forum to discuss building code proposals and interact with other stakeholders.
- Gain knowledge of the FloodSAFE Program and convey questions and concerns.

Senate Bill 5, Section 7 Building Code Overview
Ricardo Pineda provided an overview of the legislative requirements and outlined the overall project process for proposing building code updates. The applicable section is included below.

SEC 7. Section 50465 is added to the Health and Safety Code, to read:
50465. (a) On or before January 1, 2009, the Department of Water Resources shall propose for adoption and approval by the California Building Standards Commission updated requirements to the California Building Standards Code for construction in areas protected by the facilities of the

Central Valley Flood Protection Plan where flood levels are anticipated to exceed three feet for the 200-year flood event. The amendments to the California Building Standards Code shall be sufficient to reduce the risk of flood damage and protect life, safety, and the construction in those areas.

(b) Before the department proposes the amendments to the California Building Standards Code required pursuant to subdivision (a), the department shall consult with the Central Valley Flood Protection Board, the Division of the State Architect, and the Office of the State Fire Marshal.

Timing of Initial SB 5 Submittal and Final Building Standards Commission (BSC) Submittal
Jane Taylor with BSC identified the process for submittal and the timeline for the process.

Project Milestones
The next TAC meeting is tentatively scheduled for October 2nd and will be confirmed shortly. Prelimininary code package will be submitted to BSC by January 1, 2009 to meet SB 5 legislative deadline. Final code package will be submitted to BSC by July 1, 2009 to meet code amendment deadline.

Draft White Paper Overview
The Building Code Team (BC Team) provided an overview of the white paper and a PDF copy was emailed to TAC team members.

Six Provisions Under Consideration
The six most notable Provisions Under Consideration (PCs) were introduced by the BC Team. These were selected from a longer list of PCs within a decision matrix, found in the white paper appendix B. The PCs will become Proposed Code Update Requirements when the preliminary code package is submitted to the BSC at years end, after refinement by the BC Team and TAC.

1. Require a clear path for escape and rescue above the predicted elevation of the 200-year flood (homes and certain assembly occupancies, educational occupancies, and institutional occupancies).
2. Require additional foundation height (or higher floodproofing) equal to the elevation of the 200-year flood for buildings located in regulated mapped floodplains (often called the “100-year floodplain”) that are also identified as 200-year flood risks, as defined in SB5.
3. Require that buildings have adequate structural strength and load path to resist flotation during anticipated flood conditions (e.g. anchoring).
4. Require certain Occupancy Category IV facilities to protect hazardous materials against predicted flood conditions (specific facilities to be determined). As shown in the CBC Table 1604.5, Category IV includes several facilities that use hazardous materials that may be exposed, including hospitals, power generating stations, water treatment facilities, and certain other buildings and structures that contain “extremely hazardous materials.”
5. Require installation of automatic devices for gas lines and electricity service that shut off service when triggered by rising floodwaters.
6. Require use of selected flood damage-resistant materials (based on pending research to identify those materials that hinder recovery most when not resistant).

Breakout Session on Provisions Under Consideration

The TAC was divided into four groups to discuss the proposed amendments and encouraged to brainstorm on additional code provisions. Each TAC member is encouraged to email any additional comments not expressed within the meeting to walkerb@water.ca.gov. The comments that were shared by one or more TAC (and BC Team) members within the working groups that were captured at the meeting are as follows:

Provision 1 (Escape): Require a clear path for escape and rescue above the predicted elevation of the 200-year flood (homes and certain assembly occupancies, educational occupancies, and institutional occupancies).

1a) What is "clear path?" The definition provided must be refined and made clearer.
1b) Clear paths are usually not likely in a disaster situation; disasters create obstacles.
1c) Current roof designs of certain occupancies are not adequate for carrying the load of many people who might be evacuated to the roof. If safe flood escape route places people on roofs, then we'll need to design roofs for appropriate loads and may also require hand rails, etc for safety. Obviously roof slope and roof surface material to prevent slipping/sliding off of roof will have to be evaluated. Only the region of roof that would become a safe haven from flooding would need to meet increased code requirements.
1d) It will be complicated to figure out where to put these requirements into the code.
1e) Option: improve risk notification, flood warning system, and evacuation planning so fewer people are trapped during flood disasters. It is recognized that this effort is not accomplished in the building code.
1f) Don't be overly prescriptive with the code; allow designer (or architect) to demonstrate and design for the intended performance/intent.
1g) Should flood escape route be a function of anticipated flood depth? E.g., only if the predicted depth above the floor is more than 3' above the lowest floor. The idea is that there is less urgency to evacuate if depth of water isn't so great and dangerous. One benefit of this approach is that it allows the designer to elect to partially elevate rather than provide a clear escape route totally above water level.
1h) At what depth of flooding is [will] an emergency exit (escape route) [be] required?
1i) Smaller homes can still be beneficial -- don't need to have full second story (as a safe location). How about just one room (on the second story) to provide access and use as a safe location?
1j) We should not distinguish between one and two story buildings for this. More specifically, we should not think that if a building with a roof that is entirely submerged by the 200-year water surface elevation (WSEL) (e.g., a one story building) should not have a safe escape to roof while buildings with roofs above the 200-year WSEL should have them. Flood magnitudes are not predictable and flood waters rise over time. Even buildings with roofs below the 200-year WSEL could be used to save lives as people could escape to their roofs and be rescued prior to total inundation.
1k) Should it be a clear path to the roof or just anywhere above anticipated 200-year flood levels? A balcony with its floor that is above the 200-year flood level could be an acceptable safe location alternative to the roof option.
1l) The "accessibility community" should be involved in development or review of this PC. The Division of State Architect (DSA) has their DSA Advisory Board: Access Committee, while the BSC has an Accessibility Code Advisory Committee.
1m) Mechanical lifts for elevating disabled persons to safe location may need to be considered

1n) An inflatable raft that is attached to a structure in same fashion as fire extinguishers should be considered as another option, instead of roof access. Perhaps this option is not viable for places with large amounts of people, like schools or hospitals. Additionally, if the structure is not capable of withstanding flood forces and collapses, the raft option appears to be much safer. Cost appears cheaper with this alternative.

1o) As always, cost (especially for something like a roof hatch) must be considered, but after the safety benefits are studied.

Provision 2 (Elevation): Require additional foundation height (or higher floodproofing) equal to the elevation of the 200-year flood for buildings located in regulated mapped floodplains (often called the "100-year floodplain") that are also identified as 200-year flood risks, as defined in SB5.

2a) Apply provision to the finish floor only in static water level or for areas with velocities less than or equal to 2 to 3 feet per second

2b) 3-feet of height, similar to SB5, may help prevent discredit or need to justify established height for elevation other than 3-feet

2c) Elevating structures are of no benefit if the elevation moves the BFE from a total flooded scenario to a ±70% flooded scenario, based upon damage reduction, with the only exception being if roof tops were now above the predicted WSEL, improving safety. Therefore, a possible "elevation" provision would be to mandate that roof tops are above the 200-year WSEL.

2d) It is questionable whether any "elevation" requirements in addition to what is already required within the FEMA Special Flood Hazard Area (SFHA) will provide any benefit at all

2e) Should we instead require that support elements be above the 200-year flood level?

2f) If we decide to set a greater elevation requirement more than 3-feet, we will need substantial evidence to justify it.

2g) ADA conflicts will need to be addressed

2h) For broader acceptance of this provision, the justification will likely need to include "preservation of life justification"

2i) It would be beneficial to know the probable size of regions (within overall region where new codes would apply) where: (a) the current FEMA NFIP codes apply, (b) the 200-year WSEL is between 2 and 8-feet above grade, to better understand impacts of specifying a specific elevation requirement. Are we talking about relatively small or expansive regions?

2j) Keep in mind the affect of new and old homes (i.e., those under and those unaffected by the requirements) mixed together. Implementing this [major "elevation" code requirement] could affect redirected impacts and aesthetics.

Provision 3 (Strength/Load Path): Require that buildings have adequate structural strength and load path to resist flotation during anticipated flood conditions (e.g. anchoring).

3a) Forces from flood hazards should become a third design consideration in addition to earthquake and wind categories within the Building Code. Hydrostatic forces (e.g., differential in water surface between inside and outside the structure) and hydrodynamic forces (from flowing flood waters and possibly floating debris) should be evaluated

3b) Q: Is it feasible to obtain anticipated flood water velocities or water forces/loads at or near possible levee breach locations? A: There are engineering models that can predict flood water velocities during a levee breach. These models could be used to define "velocity zones" – with low velocities (e.g., away from levees) and potentially fast velocities (e.g., near levees). However, another question arises. When a levee breach (or breaches) occurs,

the immediate region is destroyed by fast velocities, yet most of the regions along the levees do not experience the fast velocities. Therefore, does it make sense to establish a "fast velocity zone" along the entire levee system (for example, 200-feet wide) when, in all probability, the buildings at or near the breach would be destroyed and all others adjacent to the other levees would likely experience moderate hydrodynamic forces?

3c) Ideally there would be a building moratorium setback from the toe of a levee to account for the dangers of possible levee breaches – but this approach doesn't help for many regions where building have already been built against the levees.

3d) The strength required within structures to prevent destructive deformation or anchoring required to resist floatation as a result of moving flood waters (as yet to be defined) may already be adequately established within seismic design code requirements for base shear. This needs to be investigated. Note that the Central Valley benefits from being in a less seismically active region to seismic requirements are less than in other areas of California.

3e) When trying to determine requirements for anchoring, are there current hold-downs that should be considered?

3f) It is significantly cost-prohibitive to design a wood-framed building to withstand fast flood water velocities.

3g) Retroactive measures are difficult to get approved and may be better to tie requirements to substantial redevelopment

Provision 4 (Category IV Occupancies): Require certain Occupancy Category IV facilities to protect hazardous materials against predicted flood conditions (specific facilities to be determined). As shown in the CBC Table 1604.5, Category IV includes several facilities that use hazardous materials that may be exposed, including hospitals, power generating stations, water treatment facilities, and certain other buildings and structures that contain "extremely hazardous materials."

4a) Design waste water treatment facilities for submergence

4b) It would be extremely costly to elevate waste water treatment plant facilities above the BFE or 200-year flood elevation

4c) There are thousands of existing Category IV facilities that would not be effected by these code requirements if only required for newly constructed and/or substantially improved facilities. Prudence suggests understanding the magnitude of threat – how many hazardous chemical containers are currently at risk during flood events. Using the SWRCB's Industrial Permit Database will be a good start as these permitted industrial facilities have plans/documentation addressing chemical storage and release prevention to storm water. The economic feasibility of requiring retrofits to all/most of existing Category IV facilities may dictate that this provision have different code update requirements for existing versus new or substantially improved facilities.

4d) As always, cost is a concern, so having many options to protect against the release of hazardous chemicals (e.g., elevating them, giving them 'armor', making them able to operate while submerged) could be important.

4e) The Reclamation [or Central Valley Flood Protection] Board already has requirements for tie-downs to prevent hazardous materials containers from floating away, but not to protect against puncture or inundation related leakage.

Provision 5 (Auto Shutoff): Require installation of automatic devices for gas lines and electricity service that shut off service when triggered by rising floodwaters.

5a) I like the concept (commented by more than one member)

5b) Are there enough historic cases of post-flood fires caused by gas leaks or electrical surges, or lack of potable water caused by contamination that this provision is warranted?
5c) Are such devices commercially available? Is there a standard for manufacturers to follow to "ensure" the devices perform as expected?
5d) Is it possible for one device to do both seismic shutoff and flood shutoff (for a given utility)? It appears that having one shut off device at each building to accommodate both seismic and flood hazards would be best.
5e) Maybe these possible code requirements only apply to certain occupancies (e.g., schools, hospitals). Or, are "they" [individuals, community emergency response leaders, utility managers?] more capable of having emergency action plans that include shutting off manually?
5f) If this is a good idea, should it be required in all floodplains?
5g) It would be more effective (i.e., lower cost and better control) to require utility companies to install shut off devices on their mains to limit entire zones. Do utility companies do something similar already in areas that flood frequently? However, one disadvantage of this approach is a total (zone by zone) utility black-out, including to critical-care facilities that may then need back-up generation.
5h) The PUC may already require shut off devices in certain seismic zones. Can those devices for seismic activity be adjusted to work for flooding too?

Provision 6 (Materials): Require use of selected flood damage-resistant materials (based on pending research to identify those materials that hinder recovery most when not resistant).

6a) We should investigate what materials that are currently available in the industry have the desired flood damage-resistant properties.
6b) Are there established standards for what materials can be called "flood damage-resistant materials?" If not, what is the likely effort to create those standards and is it feasible at this time?
6c) Unlikely to be cost-effective to require ALL materials to be FDR Materials
6d) Maybe require only those materials that are structural (studs, sheathing for shear, subflooring) to be flood-resistant and dimensionally stable
6e) There will be a lot of resistance to this provision
6f) Perhaps the best alternative to implement these FDR materials is to add within optional code (appendix) and the State provides a reduced flood insurance rate beyond FEMA NFIP and/or CRS (Community Rating System) flood insurance rate discounts
6g) Some materials that are highly flood resistant may not be the preferred building material for earthquake design or have poor energy efficiency

Discussion Items

- Most voluntary provisions are not adopted by the local agencies.
- The Central Valley Flood Protection Plan addresses flood protection improvements including integration with water supply.
- DWR is conducting policy discussions on where the requirements should apply.
- TAC to assist in determining if velocity zones are needed and if so how to determine the zones.

- These provisions would apply, under current thought, to new and substantially improved construction. Only provision 2, at this time, appears to have potential of requiring all/most existing Category IV industrial facilities to be retrofitted.
- A definition for deep flooding is needed.
- Provided opportunity for members to suggest additional provisions that the BC Team and TAC should consider. The following is suggested as another possible provision:
    - For hospitals and other health care facilities with patient beds (where evacuation is less likely to occur rapidly), require that emergency backup power/generators & fuel storage to be located above the predicted water surface elevation of the 0.5-percent change flood (e.g., 200-year flood) event

Other Comments/Concerns

- Use current triggers in the code to determine whether an existing building undergoing structural alternations would need to be brought into compliance. The rationale is that it would be easier to rely on current triggers that require seismic compliance as well, rather than inject the NFIP's 50% rule (i.e., substantial building improvement estimated at more than 50% of initial value) to apply to areas outside of SFHAs (Special Flood Hazard Areas).
- Diagrams depicting the different levee and 200-year flood elevation scenarios should be developed so that TAC members can understand where these codes could apply.
- Could the type of flood event being considered be better defined?
- TAC meetings should be longer than 4-hours.
- Additional stakeholders groups need to be included in TAC meetings; these are OSHPD, PUC, and the WQCB. The AIA was previously invited.
- The entities that were not able to attend TAC meeting #1 could come to TAC meeting #2 an hour earlier so they can be briefed.

Action Items

- BC Team to send TAC Meeting #1 notes to TAC
- BC Team to schedule Meeting #2 location and time
- TAC and BC Team to identify and invite missing stakeholder groups
- BC Team to identify scenarios for which codes apply
- TAC to email / submit comments on provisions to Brian Walker, walkerb@water.ca.gov
- BC Team to dialog with the DSA Advisory Board: Access Committee and the Accessibility Code Advisory Committee which reports to the BSC regarding Provision 1
- DWR, through the BC Team, shall develop a Request For Proposal or similar document to commission investigations of the current building code to document how much benefit the existing code provides to minimize structural damage and provide public safety
- Define “deep flooding” and better define the flood event under consideration
- BC Team to begin investigating (1) the amount of deaths that occurred as a result of individuals being trapped in their buildings during floods and (2) how many hazardous chemical containers are currently at risk during flood events through researching the SWRCB’s Industrial Permit Database and CVFPB tie-down requirements.
- Note comments that are outside building code scope for possible implementation elsewhere