ICCPC

2019 GROUP B PROPOSED CHANGES TO THE I-CODES ALBUQUERQUE COMMITTEE ACTION HEARINGS

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INTERNATIONAL CODE COUNCIL®

2018-2019 Code Development Cycle, Group B (2019) Proposed Changes to the 2019 *International Codes*

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ICCPC Code Change Proposals

The following code change proposals are labeled as Performance code change proposals because they are proposals for changes to sections in chapters of the International Code Council Performance Code that are designated as the responsibility of the ICCPC Development Committee (see page x of the Introductory pages of this monograph). However the changes included in this Group B code development cycle are to sections of the code that have been prefaced with a [S], meaning that they are the responsibility of a different IBC Code Development Committee—IBC-Structural Committee [S].

The committee assigned for each code change proposal is indicated in a banner statement near the beginning of the proposal.

PC1-19

ICCPC®: [BS] 501.3.4

Proponent: Robert Pekelnicky, Degenkolb Engineers, representing Self (RPekelnicky@degenkolb.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Code Council Performance Code

Revise as follows:

[BS] 501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.
3. Impact loads.
4. Explosion loads.
5. Soil and hydrostatic pressure loads.
6. Flood loads (mean return period).
   Small: 100 years
   Medium: 500 years
   Large: Determined on a site-specific basis
   Very Large: Determined on a site-specific basis
7. Wind loads (mean return period).
   Small: ~~50~~ 300 years
   Medium: ~~75~~ 700 years
   Large: ~~100~~ 1,700 years
   Very Large: ~~125~~ 3,000 years
8. Windborne debris loads.
9. Snow loads (mean return period).
   Small: 25 years
   Medium: 30 years
   Large: 50 years
   Very Large: 100 years
10. Rain loads. See Table 501.3.4.
11. Earthquake loads (mean return period).
    Small: 25 years
    Medium: 72 years
    Large: 475 years, but need not exceed two-thirds of the intensity of very large loads
    Very Large: 2,475 years. At sites where the 2,475-year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, very large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.
12. Ice loads, atmospheric icing (mean return period).
    Small: 25 years
    Medium: 50 years
    Large: 100 years
    Very Large: 200 years
13. Hail loads.
14. Thermal loads.

Reason: The wind load return periods in the ICCPC are significantly misaligned with ASCE 7-16. The return periods proposed match the return periods in Chapter 26 of ASCE 7 and Figure 1609.3 in the IBC. Since the 2010 edition of ASCE 7, the wind speeds used for design of the main wind resisting force system, components and cladding, and nonstructural components have been based on ultimate wind speeds with a load factor of 1.0. Per ASCE 7-16, as Risk Category II building is supposed to be designed for a wind speed with a mean recurrence interval of 700 years. All structural and nonstructural elements are supposed to be designed elastically for that wind speed based on the applicable material design standards. Such design would likely correlate to the "mild impact" tolerable damage state for structural performance and "moderate impact" for the nonstructural performance. Per the current ICCPC, a designer would only need to consider a 50- or 75-year wind speed. Because performance-based designs commonly use ultimate loads and the ICCPC does not indicate that one should or should not use a load factor, a user attempting a performance-based design could significantly under design a structure under the current ICCPC compared to one designed per the IBC and its reference standards.

Bibliography: American Society of Civil Engineers, 2016, *Minimum Design Loads and Associated Criteria For Buildings And Other Structures (7-*

16), Reston, VA

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal is not intended to affect the cost of construction. It is simply aligning the ICCPC wind design provisions with the IBC wind speeds.

Proposal # 5399

PC1-19

PC2-19

ICCPC®: [BS] 501.3.4

Proponent: Robert Pekelnicky, representing Self (RPekelnicky@degenkolb.com)
THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Code Council Performance Code

Revise as follows:

[BS] 501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.
3. Impact loads.
4. Explosion loads.
5. Soil and hydrostatic pressure loads.
6. Flood loads (mean return period).
   Small: 100 years
   Medium: 500 years
   Large: Determined on a site-specific basis
   Very Large: Determined on a site-specific basis
7. Wind loads (mean return period).
   Small: 50 years
   Medium: 75 years
   Large: 100 years
   Very Large: 125 years
8. Windborne debris loads.
9. Snow loads (mean return period).
   Small: 25 years
   Medium: ~~30~~ 50 years
   Large: ~~50~~ 100 years
   Very Large: ~~100~~ 500 years
10. Rain loads. See Table 501.3.4.
11. Earthquake loads (mean return period).
    Small: 25 years
    Medium: 72 years
    Large: 475 years, but need not exceed two-thirds of the intensity of very large loads
    Very Large: 2,475 years. At sites where the 2,475-year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, very large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.
12. Ice loads, atmospheric icing (mean return period).
    Small: 25 years
    Medium: 50 years
    Large: 100 years
    Very Large: 200 years
13. Hail loads.
14. Thermal loads.

Reason: The snow load return periods in the ICCPC are significantly misaligned with ASCE 7-16. The return periods proposed are based on estimates of what the return periods would be if the snow load factor was 1.0 instead of 1.6. In the IBC, all structural and nonstructural elements are supposed to be designed elastically for a 50-year return period snow load what is factored up by both a load factor and an importance factor based on Risk Category. Such design would likely correlate to the "mild impact" tolerable damage state for structural performance. Per the current ICCPC, a designer would only need to consider a 50-year snow load, without any increase in force. Because performance-based designs commonly use ultimate loads and the ICCPC does not indicate that one should or should not use a load factor, a user attempting a performance-based design could significantly under design a structure under the current ICCPC compared to one designed per the IBC and its reference standards.

Bibliography: American Society of Civil Engineers, 2016, *Minimum Design Loads and Associated Criteria For Buildings And Other Structures (7-16),* Reston, VA

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal is not intended to affect the cost of construction. It is simply aligning the ICCPC snow design provisions with the IBC

snow design provisions.

Proposal # 5405

PC2-19

PC3-19

ICCPC®: [BS] 501.3.4

Proponent: Kelly Cobeen, Wiss Janney Elstner Associates, representing Federal Emergency Management Agency and Applied Technology Council Seismic Code Support Committee (FEMA/ATC SCSC) (KCobeen@wje.com); Robert Pekelnicky, Degenkolb Engineers, representing Federal Emergency Management Agency and Applied Technology Council Seismic Code Support Committee (FEMA/ATC SCSC) (rpekelnicky@degenkolb.com); Michael Mahoney, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov)

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2018 International Code Council Performance Code

Revise as follows:

[BS] 501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.
3. Impact loads.
4. Explosion loads.
5. Soil and hydrostatic pressure loads.
6. Flood loads (mean return period).
   Small: 100 years
   Medium: 500 years
   Large: Determined on a site-specific basis
   Very Large: Determined on a site-specific basis
7. Wind loads (mean return period).
   Small: 50 years
   Medium: 75 years
   Large: 100 years
   Very Large: 125 years
8. Windborne debris loads.
9. Snow loads (mean return period).
   Small: 25 years
   Medium: 30 years
   Large: 50 years
   Very Large: 100 years
10. Rain loads. See Table 501.3.4.
11. Earthquake loads (mean return period).
   Small: ~~25~~ 43 years
   Medium: 72 years
   Large: 475 years, but need not exceed two-thirds of the intensity of very large loads
   Very Large: 2,475 years. At sites where the 2,475-year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, very large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.
12. Ice loads, atmospheric icing (mean return period).
   Small: 25 years
   Medium: 50 years
   Large: 100 years
   Very Large: 200 years
13. Hail loads.
14. Thermal loads.

Reason: This proposal aligns the Small hazard intensity the ICCPC stipulates be used for design for buldings and other structures for earthquake effects with what is used in current performance-based design practice. The 43-year hazard is referenced in the PEER Tall Building Initiative, Version 2 (PEER, 2017) and the Loas Angeles Tall Building Structural Design Council document (2018). While these documents were drafted for tall buldings, thier procedures have been used for design of other than tall buldings. Without this change, use of the ICCPC would provide a less servicable building under learthquake loading than current practices has accepted.

Bibliography: PEER, 2017. Guidelines for Performance-Based Seismic Design of Tall buildings, Version 2.03, The Pacific Earthquake Engineering Research Center, Berkeley, California.
Los Angeles Tall Buildings Structural Design Council, 2018. An Alternative Procedure for Seismic Analysis and Design of Tall Buildings Located in

the Los Angeles Region, A Consensus Document, 2017 Edition with 2018 Supplements. Los Angeles Tall Buildings Structural Design Council, Los Angeles, California.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There will be no cost impact because this change simply aligns the ICCPC with current performance-based design practice.

Proposal # 4582

PC3-19

PC4-19

ICCPC®: [BS] 501.3.4

Proponent: Kelly Cobeen, Wiss Janney Elstner Associates, representing Federal Emergency Management Agency and Applied Technology Council Seismic Code Support Committee (FEMA/ATC SCSC) (KCobeen@wje.com); Robert Pekelnicky, Degenkolb Engineers, representing Federal Emergency Management Agency and Applied Technology Council Seismic Code Support Committee (FEMA/ATC SCSC) (rpekelnicky@degenkolb.com); Michael Mahoney, representing Federal Emergency Management Agency (mike.mahoney@fema.dhs.gov)

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2018 International Code Council Performance Code

Revise as follows:

[BS] 501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.
3. Impact loads.
4. Explosion loads.
5. Soil and hydrostatic pressure loads.
6. Flood loads (mean return period).
   Small: 100 years
   Medium: 500 years
   Large: Determined on a site-specific basis
   Very Large: Determined on a site-specific basis
7. Wind loads (mean return period).
   Small: 50 years
   Medium: 75 years
   Large: 100 years
   Very Large: 125 years
8. Windborne debris loads.
9. Snow loads (mean return period).
   Small: 25 years
   Medium: 30 years
   Large: 50 years
   Very Large: 100 years
10. Rain loads. See Table 501.3.4.
11. Earthquake loads ~~(mean return period)~~ .
   Small: 25 years <u>(mean return period)</u>
   Medium: 72 years <u>(mean return period)</u>
   Large: ~~475 years, but need not exceed two-thirds~~ <u>Two-thirds</u> of the intensity of very large loads
   Very ~~Large: 2,475 years. At sites where the 2,475-year, 5-percent damped spectral response acceleration at a 0.3-second period exceeds 1.5 g and at a 1-second period exceeds 0.6 g, very large ground shaking demands need not exceed a 5-percent damped response spectrum that at each period is 150 percent of the median spectral response acceleration ordinate resulting from a characteristic earthquake on any known active fault in the region.~~ <u>large: The Risk-Targeted Maximum Considered Earthquake defined in Chapter 21 of ASCE 7.</u>
12. Ice loads, atmospheric icing (mean return period).
   Small: 25 years
   Medium: 50 years
   Large: 100 years
   Very Large: 200 years
13. Hail loads.
14. Thermal loads.

Reason: This code change updates the hazard intensity that ICCPC stipulates be used for design of buildings and other structures for earthquake effects to align with ASCE 7-16, the engineering standard referenced in the 2018 IBC. The definition of Very Large hazard published in the 2018 ICCPC is based on a definition of the Maximum Considered Earthquake from ASCE 7-05. Starting with the 2010 edition of ASCE 7, the Maximum Considered Earthquake definition changed to reflect a risk-targeted probabilistic hazard, as opposed to the uniform hazard defined by the 2,475 year return period. The risk-targeted probablistic hazard for Large and Very Large earthquakes varies in return period across the country. Additionally, the ASCE 7-16 deterministic cap has changed from 150% of the mean shaking intensity of the characteristic earthquake to a mean plus one standard deviation shaking intensity from the characteristic earthquake, which is approximately 180% of the mean. This results in the Very Large event currently specified in the 2018 ICCPC being 20% lower than ASCE 7-16 specifies in capped regions. For the Large event, two-thirds of the

Risk-Targeted Maximum considered Earthquake (MCE sub R) has a return period significantly higher than 475 years for most of the country. Continued use of the 2018 ICCPC 475 year return period for the Large earthquake would be substantially unconservative at many locations relative to the seismic design provisons of the 2018 IBC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There will be no cost impact because this change simply aligns the seismic hazard descriptions of the ICCPC with the engineering standard referenced in the IBC.

Proposal # 4586

PC4-19

PC5-19

ICCPC®: [BS] 501.3.5

Proponent: Robert Pekelnicky, representing Self (RPekelnicky@degenkolb.com)
THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

2018 International Code Council Performance Code

Revise as follows:

[BS] 501.3.5 Safety factors. The design of buildings and structures shall consider appropriate factors of safety to provide adequate performance from:

1. Effects of uncertainties resulting from construction activities.
2. Variation in the properties of materials and the characteristics of the site.
3. Accuracy limitations inherent in the methods used to predict the stability of the building.
4. Self-straining forces arising from differential settlements of foundations and from restrained dimensional changes due to temperature, moisture, shrinkage, creep and similar effects.
5. Uncertainties in the determination of the expected loads.

Reason: The ICCPC currently does not list uncertainties in the determination of the design load as one of the things that should be considered when determining an appropriate factor of safety. All expected loads have an uncertainty associated with them, whether it be an environmental load expressed using a return period or a live load based on the use of the space. Those uncertainties are taken in to account in the development of the design loads in the IBC and the ASCE 7-16 standard. This change makes it clear that such uncertainties be considered if one choses to do a performance-based design per the ICCPC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This code change proposal will not affect the cost of construction, as it simply aligns the requiremetns of the ICCPC with the perscriptive requirements of the IBC and its reference standards.

Proposal # 5407

PC5-19