



STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

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Final Cost Benefit Analysis for the 2021 International Building Code (Structural Provisions)

I. Code Adoption and Significant legislative Rules

1. Introduction

The Washington State Building Code Council (SBCC) is required to adopt and maintain the state building code, as provided in chapters 19.27, 19.27A, and 70.92 RCW, and the state legislature. The primary objective of the Council is to encourage consistency in the building code throughout the state of Washington and to maintain the building code consistent with the state's interest as provided in RCW 19.27.020. The statewide code adoption process is defined in WAC 51-04 and the Council by-laws. Since 1985, the Council has been responsible for the adoption to update to new editions of the model codes per RCW 19.27.074, including the International Building Code (IBC). The IBC is updated every three years by the International Code Council (ICC). The code development process conducted by the model code organization is open to all interest groups within the design and construction industry and from governmental organizations.

The Council adopts the building codes in accordance with the Administrative Procedures Act (APA). The general procedures for rulemaking are laid out in part III of the Act (RCW 34.05.310 through RCW 34.05.395). Administrative rules governing the procedures for agency rulemaking have been adopted by the Office of the Code Reviser and are found at WAC 1-21-005 through WAC 1-21-180.

2. Adoption of 2021 International Building Code, Structural Provisions.

The Council is filing a final rule to adopt the 2021 edition of the International Building Code (IBC), structural provisions (WAC 51-50). The Preproposal Statement of Inquiry (CR 101) to initiate the development of the 2021 IBC, as adopted through WAC 51-50, was filed as WSR 22-03-032 on January 11, 2022. The proposed rule (CR-102) to adopt the 2021 IBC with State amendments was filed as WSR 22-17-151 on August 23, 2022

On February 18, 2022, the Council opened a submittal period for proposals for statewide amendments to the 2021 IBC. All stakeholders and interested parties could submit proposals to meet the legislative goals. All proposals are submitted in writing on the appropriate form with the indicated supporting documentation. Each proponent is required to identify if the proposed amendment has an economic impact and estimate the costs and savings of the proposal on construction practices, users and/or the public, the enforcement community, and operation and maintenance.



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The Council has adopted a definition of cost-effectiveness based on RCW 39.35 as recommended by Department of Commerce. A guide on how to evaluate cost-effectiveness is therefore defined by the Council as a code change that has a net present savings over a 50-year life cycle of a building utilizing the Life Cycle Cost Tool (LCCT) as developed by the Washington State Office of Financial Management (OFM). The methodology of the LCCT is based on the NIST Handbook 135 methodology and utilizes specific inputs as determined by the Council with guidance from the Washington State Department of Commerce. The cost effectiveness analysis uses the average useful life years from Appendix 7 of the BOMA Preventive Maintenance Guidebook for all building components that are evaluated. Each submitted code change proposal that is not editorial or explanatory, is required to include this analysis. The proponents are also allowed to use an alternate cost benefit analysis.

In considering amendments to the model code, the Council established and consulted with a technical advisory group (TAG), including representatives of appropriate state agencies, local governments, general contractors, building owners and managers, design professionals, utilities, and other interested parties. The TAG was tasked with reviewing the proposals, identifying pros and cons and whether it helped achieve the broader goals of ensuring buildings and facilities constructed in the state are safe and healthy for building occupants, accessible to persons with disabilities and the elderly, and energy efficient. The TAG also discussed whether modifications were needed to ensure the provisions were correlated with other requirements, technically feasible, commercially available, and cost-effective to building owners and tenants, or if changes were necessary to mitigate any disproportionate impact on small business.

Seven proposals were submitted during the submittal period. After hundreds of hours of discussions, the TAG recommended approval of five proposals as submitted or as modified; three proposals were approved with Group 1 codes. One proposal was identified by the proponent and the TAG as having a cost increase. Two proposals were identified by the proponents and the TAG as having a cost decrease. Five proposals are exempt from the cost benefit analysis requirement of RCW 34.05.328 as they are editorial or provide consistency or additional clarity to existing rules or model code language.

The proposed rule adopts by reference the 2021 IBC with new and existing amendments. Many of the existing amendments are modified to incorporate changes to the model codes or to clarify language. There are 16 significant changes to the model code with economic impact. However, the model code changes are exempt under RCW 19.85.025(3) and RCW 34.05.310 (4)(c), and are not part of this analysis.



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The public hearing process consists of a public comment period and public hearings. The Council received written comments between August 23, 2022, and October 14, 2022. Oral testimony was received at two public hearings – one in Yakima (September 30, 2022) and one in Olympia (October 14, 2022). After the public hearings, the Council held a work session to review testimony and receive clarification on issues raised by Council members. The Council recommended several modifications to the initial proposal; the 2021 IBC with State amendments, as modified, was adopted at the meeting on November 18, 2022.

The local enforcement authority having jurisdiction administers the codes through the building and/or fire departments. Administrative procedures for state building code compliance are established and will not be changed by the adoption of the 2021 IBC. All businesses, including small businesses, will employ the same types of professional services for the design and construction of buildings and systems to comply with the state building code. The proposed rule updates the state building code and does not require additional equipment, supplies, labor, or other services. Services needed to comply with the building code are existing within the construction industry as required by the local authority having jurisdiction.

The proposed rule makes the IBC consistent with national standards. Businesses with new products or updated test or design standards are recognized in the updated building code. The update will result in some cost outlay for some businesses for specific building projects, for a transition period. Other businesses would see an increase in revenue. The primary intent of the amendments is to improve the safety features in buildings and provide consistency and fairness across the state, for a predictable business environment. The amendments should result in enhanced safety and value in buildings.

II. Code Proposals Identified as Significant.

1. Summary of Probable Benefits vs Probable Costs.

1.1. Chapter 35, Referenced Standards ([21-GP2-017](#)).

The purpose of amending ASCE 7 is to adopt the Supplements to 2016 edition of ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16), developed by the ASCE 7 Standard Committee to address important issues in between cycles of development. Some of the noted deficiencies in the ASCE 7-16 standard affect high seismic hazard locations such as Washington state and could potentially result in unconservative structural design. Hence, we request that this be adopted under the 2021 IBC reference standards. The ASCE 7-16 standard now has



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three published supplements- Supplement No.1 was published on December 11, 2018, Supplement No.2 was published on October 19, 2021, and Supplement No. 3 was published on November 3, 2021. Supplement No.1 was adopted into the 2021 International Building Code, but Supplement No.2 and Supplement No.3 were not included as they have just been recently published.

The proposed amendment is needed to address a critical life/safety need, to clarify the intent of the code, and to correct errors and omissions. The adoption of ASCE 7-16 Supplements shouldn't impact the cost of construction for most building structures. However, since some of the changes address the deficiencies for specific structures such as in buildings with extreme torsional irregularities (Supplement No. 2) and seismic design of liquid storage tanks (Supplement 3), the design for these buildings and structures could result in increase in structural design loads than designs proportioned by applying just the originally published standard. It is difficult to quantify the construction cost increase for the noted specific structures because the potential increase in seismic loads depends on several factors and seismic demands is only a fraction of the overall loading. This potential amplification of structural loading for the noted building types is a necessary correction in order to meet the life safety criteria of the structure.

A reduction in code enforcement time is expected as this proposal would clarify the building code which would avoid the need for design corrections. There is negligible or no impact to small businesses and housing affordability.

1.2. Section 2103.2.4 Mortar for adhered masonry veneer. ([21-GP1-65R](#))

A common mode of failure of adhered veneer is the debonding of the units from the wall. Requiring a modified dry-set bond coat mortar capable of developing higher bond strength is warranted. ANSI A118.15, for example, requires a 28-day shear bond strength near 400 psi for an improved-modified dry-set mortar, which is significantly higher than the current TMS 402 requirement of 50 psi. The latest draft for the next TMS reference code edition contains a similar amendment. This new amendment is an early adoption of this beneficial code provision in Washington state. Additionally, the method of installation prescribed in the TMS specification was developed in the 1950s but is not used today for the installation of adhered veneer.

The material cost difference between standard ASTM C270 mortar and ANSI A118.4/A118.15 mortar is approximately five cents per square foot more for the ANSI mortar. However, there are labor savings associated with its use that typically result in a **cost reduction** for the constructed wall assembly. ANSI mortar improves workability,



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pot-life, and coverage along with increasing shear bond strength. It also helps to mitigate failures and saves potential replacement costs.

There is no impact on code enforcement, small businesses, or housing affordability.

1.3. Sections 1613.4.3 through 1613.4.6. ([21-GP2-027](#)):

The current method in ASCE 7-16 for developing seismic design response spectra is very complex, and it requires additional ground motion hazard analyses for many more building sites than required in previous versions of the code. The same amendment was adopted as an emergency rule (WSR 22-11-010) and it is effective until July 1, 2023. If adopted, this proposal will adopt the rule permanently.

This code change would decrease the cost of development on sites where the current building code requires ground motion hazard analysis by providing an alternative approach that does not necessitate the added costs (i.e. building owners hiring geotechnical engineer of record with significant seismic expertise to perform ground motion hazard analyses, and municipal review agencies contracting third-party ground motion hazard analysis reviewers) associated with the current building code requirements. The reduction in cost varies significantly with the building type, size, and location within the State of Washington. In addition, this proposal simplifies the review process by substituting a standardized design process (lookup seismic design values online) for a custom process (site-specific spectrum by geotechnical engineer). Plan review time will be reduced because a custom process won't need to be understood for each building. This proposal simplifies the design of new buildings, reduces the time required for design, reduces required materials, and decreases construction costs. In addition, plan review time will be reduced; material and design costs will decrease for small businesses and for multi-family residential buildings.

1.4. Section 1613.4.1 ([21-GP2-028](#)):

The 2021 IBC includes changes in a reference standard that duplicate changes made by an amendment to the Washington State Building Code. These changes relate to the construction of concrete special structural walls which are seismic force resisting elements of a building structural system and are common in commercial and multi-family residential construction. The amendment to the Washington State Building Code Section 1613.4.1 part 5 was previously needed in the building code as similar requirements weren't included in the reference standards. The 2018 IBC reference standard ACI 318-19 has added similar requirements to those of the amendment. The amendment to the Washington State Building Code should be removed for clarity. By



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removing Amendment Section 1613.4.1 part 5, an engineer will be clear that the provisions and ACI 318- 19 should be used directly. Without the removal of Item 5, it is unclear if the factors referenced by the amendment and the factor of the reference standards should be used together, which could result in an overestimation of design forces by a factor of 2.5. This would result in an increase in the size of special concrete walls used in new construction.

The proposal is intended to clarify the intent or application of the code, and to avoid a conflict between the model code and the existing Washington amendment. Nevertheless, the proposal is calculated to bring \$30/square foot **reduction in construction cost**.

If the design requirements are mis-interpreted to mean that the Ω_o factor needs to apply to concrete wall shear twice, then costs are estimated as shown below.

Estimated cost of commercial/multi-family residential construction = \$500/sf

Estimated fraction structural cost / total construction cost = $\frac{1}{4}$

Estimated fraction special concrete walls / structural cost = $\frac{1}{6}$

Estimated increase in design forces if overstrength factor of 2.5 is duplicated = 150%

Total estimated cost = $\$500/\text{sf} \times \frac{1}{4} \times \frac{1}{6} \times 1.5 \sim \$30/\text{sf}$

A reduction in code enforcement time is also expected as this proposal would clarify the building code which would avoid the need for design corrections.



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2. List of Code Proposals.

Date: 5/27/2021

Log # [21-GP1-62R](#)

Proponent and description: *Kathleen Petrie; 2021 IBC Section 2303.1.1.3 Used solid-sawn lumber*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020](#) - Purposes—Objectives—Standards.

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes throughout the state. Accordingly, this chapter is designed to effectuate the following purposes, objectives, and standards:

- (1) To require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire and life safety.
- (2) To require standards and requirements in terms of performance and nationally accepted standards.
- (3) To permit the use of modern technical methods, devices and improvements.
- (4) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or retard the use of new materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.
- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The amendment clarifies the intent or application of the code and provides consistency with the International Residential Code (IRC). A similar proposal was approved by the State Building Code Council and published as a 2018 amendment in the IRC (Section R602.1.1). Approval of this proposal will put the IBC and the IRC in alignment with respect to the reuse of salvaged dimensional sawn lumber. When constructing to the requirements of the IBC, quality, salvaged solid-sawn lumber that is ungraded or does not have a certificate of inspection cannot currently be reused in a structural capacity unless allowed by the Building Official. The intent of this proposal is to assume conservative material base values that reflect past construction methods which will expand the use of salvaged lumber without compromising safety. Prior to 1980, Douglas fir and Hem-fir No. 2 were the predominant wood species used in residential construction. In the 1980's, Spruce-pine-fir (SPF) stud grade became more commonly used for non-bearing walls and other non-structural applications in order to help meet the increased building demand in Washington State. Without grading or certifying the material, we cannot assume that a stud (2x material) extracted from one building to be reused in another, is Douglas fir. By assigning the base values of SPF stud grade to the lumber, we allow structural use of this material only to the capacity of the weakest wood species that would have been used in a previous building. To assign Hem-fir No. 2 base values for all other dimensional lumber, a factor of safety is built in because these values reflect the minimum quality lumber that would have been used for beams and columns in a previous building. Approving this proposal will put the IBC in alignment with the allowance in the IRC.



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*The proposal applies only to those choosing to build with salvaged lumber. By reusing salvaged lumber, this provision eliminates the cost of having the lumber professionally graded or inspected in order to be certified. Also, if salvaging lumber from one site to reuse it in other projects, that material it is essentially **free or provides a cost-savings** to the developer/contractor.*

There is no impact on code enforcement, small businesses, or housing affordability.

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.

(1)(f) Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law:

The primary objective of the Council is to encourage consistency in the building code throughout the state, and to maintain the building code consistent with the state's interest. The rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

(1)(g) Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law:

The adoption and amendment of the 2021 IBC do not impose more stringent performance requirements on private entities than on public entities.

(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

This does not differ from any federal regulations or statute applicable to the same activity.

(1)(i) A state statute explicitly allows the agency to differ from federal standards; or

(1)(ii) Substantial evidence that the difference is necessary to achieve the general



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goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 5/27/2021

Log # [21-GP1-63R](#)

Proponent and description: *Todd Beyreuther; 2021 IBC Sections 2304.11.2.1, 2304.11.2.2, 2304.11.3.1, 2304.11.4.1 - prescriptive thickness requirements of cross-laminated timber.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

RCW 19.27.020 - Purposes—Objectives—Standards.

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- (3) To permit the use of modern technical methods, devices and improvements.
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- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The proposed amendment clarifies the intent and application of the code and provides consistency with the model code. The amendments all address prescriptive thickness requirements of cross-laminated timber in Chapter 23, originally added in the 2018 IBC model code. With the addition of Type IV-A/B/C construction types in Section 6 of the 2021 IBC model code. Section 602.4 combines the new performance-based requirements of Type IV-A/B/C with the existing prescriptive requirements of Type IV-HT in Chapter 2304.11.

The proposed amendments to 2304.11.2.1 Exterior walls, 2304.11.2.2 Interior walls or partitions, and 2304.11.4.1 Cross-laminated timber roofs simply add consistency and specificity in language (actual thicknesses rather than mix of actual, nominal, or notdefined) without modification of prescribed CLT thickness. Nominal dimensions are not used by CLT manufacturers, architects, engineers, or contractors. The proposed amendment to 2304.11.3.1 Cross-laminated timber floors proposes a change from 4 inches actual thickness to 3.5 inches actual thickness with proposed justification of equivalency to or exceedance of allowable prescriptive nominal thicknesses in 2304.11.3.2 Sawn or glued-laminated plank floors.

The benefit of the proposed prescriptive thickness change to CLT floors adds consistency and flexibility in specification between CLT, GLT, NLT, DLT and is inclusive of standardized metric CLT sizes of 90mm and 100mm. The additional performance requirements in Section 602.4 Type IV remain unchanged. There is no intended change in regulatory effect and no economic impact associated with this proposal.



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There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.

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(1)(g) Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law:

The adoption and amendment of the 2021 IBC do not impose more stringent performance requirements on private entities than on public entities.

(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

This does not differ from any federal regulations or statute applicable to the same activity.

(1)(i) A state statute explicitly allows the agency to differ from federal standards; or

(1)(ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 5/27/2021

Log # [21-GP1-65R](#)

Proponent and description: *Tom Young; 2021 IBC 2103.2.4 Mortar for adhered masonry veneer.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020](#) - Purposes—Objectives—Standards.

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- (3) To permit the use of modern technical methods, devices and improvements.
- (4) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or retard the use of new materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.
- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The mortar components of an adhered veneer masonry wall system include the following:

- 1) A scratch coat, or scratch coat and mortar bed (float coat)*
- 2) An adhesive cementitious bond coat*
- 3) Joint mortar*

Item 1 is the substrate mortar component. It is applied over a structural back-up wall. Item 2 is the adhesive bond coat and is the focus of this code change with the objective of increasing the mortar shear bond strength and improving the performance of these wall systems. Item 3 is the mortar between masonry units on the wall exterior.

A common mode of failure of adhered veneer is the debonding of the units from the wall. This can result in a life safety matter. Requiring a modified dry-set bond coat mortar capable of developing higher bond strength is warranted. ANSI A118.15, for example, requires a 28-day shear bond strength near 400 psi for an improved-modified dry-set mortar, which is significantly higher than the current TMS 402 requirement of 50 psi. The latest draft for the next TMS reference code edition contains a similar amendment. Approving this proposed amendment would permit early adoption of this beneficial code provision in Washington state. Additionally, the method of installation prescribed in the TMS specification was developed in the 1950s but is not used today for the installation of adhered veneer.



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The amendment is needed to address a critical life/safety need. ANSI mortar improves workability, pot-life, and coverage along with increasing shear bond strength. It also helps to mitigate failures and saves potential replacement costs.

*The material cost difference between standard ASTM C270 mortar and ANSI A118.4/A118.15 mortar is approximately five cents per square foot more for the ANSI mortar. However, there are labor savings associated with its use that typically result in a **cost reduction** for the constructed wall assembly. ANSI mortar improves workability, pot-life, and coverage along with increasing shear bond strength. It also helps to mitigate failures and saves potential replacement costs.*

There is no impact on code enforcement, small businesses, or housing affordability.

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.

(1)(f) Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law:

The primary objective of the Council is to encourage consistency in the building code throughout the state, and to maintain the building code consistent with the state's interest. The rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

(1)(g) Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law:

The adoption and amendment of the 2021 IBC do not impose more stringent performance requirements on private entities than on public entities.



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(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

This does not differ from any federal regulations or statute applicable to the same activity.

(1)(i) A state statute explicitly allows the agency to differ from federal standards; or

(1)(ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 4/1/2022

Log # [21-GP2-017](#)

Proponent and description: *Julius Carreon; 2021 IBC Chapter 35 Referenced Standards (ASCE/SEI).*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020 - Purposes—Objectives—Standards.](#)

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes throughout the state. Accordingly, this chapter is designed to effectuate the following purposes, objectives, and standards:

- (1) To require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire and life safety.
- (2) To require standards and requirements in terms of performance and nationally accepted standards.
- (3) To permit the use of modern technical methods, devices and improvements.
- (4) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or retard the use of new materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.
- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The purpose of this amendment is to adopt the Supplements to 2016 edition of ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16), developed by the ASCE 7 Standard Committee to address important issues in between cycles of development. Some of the noted deficiencies in the ASCE 7-16 standard affect high seismic hazard locations such as Washington state and could potentially result in unconservative structural design. Hence, we request that this be adopted under the 2021 IBC reference standards. The ASCE 7-16 standard now has three published supplements- Supplement No.1 was published on December 11, 2018, Supplement No.2 was published on October 19, 2021, and Supplement No. 3 was published on November 3, 2021. Supplement No.1 was adopted into the 2021 International Building Code, but Supplement No.2 and Supplement No.3 were not included as they have just been recently published.

The proposed amendment is needed to address a critical life/safety need, to clarify the intent of the code, and to correct errors and omissions. The adoption of ASCE 7-16 Supplements shouldn't impact the cost of construction for most building structures. However, since some of the changes address the deficiencies for specific structures such as in buildings with extreme torsional irregularities (Supplement No. 2) and seismic design of liquid storage tanks (Supplement 3), the design for these buildings and structures could result in increase in structural design loads than designs proportioned by applying just the originally published standard. It is difficult to quantify the construction cost increase for the noted specific structures because the potential



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increase in seismic loads depends on several factors and seismic demands is only a fraction of the overall loading. This potential amplification of structural loading for the noted building types is a necessary correction in order to meet the life safety criteria of the structure.

A reduction in code enforcement time is expected as this proposal would clarify the building code which would avoid the need for design corrections. There is negligible or no impact to small businesses and housing affordability.

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.

(1)(f) Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law:

The primary objective of the Council is to encourage consistency in the building code throughout the state, and to maintain the building code consistent with the state's interest. The rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

(1)(g) Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law:

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(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

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(1)(i) A state statute explicitly allows the agency to differ from federal standards; or

(1)(ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 4/4/2022

Log # [21-GP2-027](#)

Proponent and description: *Kai Ki Mow, Susan Chang; 2021 IBC Section 1613.4 Amendments to ASCE 7.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020](#) - Purposes—Objectives—Standards.

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes throughout the state. Accordingly, this chapter is designed to effectuate the following purposes, objectives, and standards:

- (1) To require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire and life safety.
- (2) To require standards and requirements in terms of performance and nationally accepted standards.
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- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

This amendment provides a simplified method to develop seismic design parameters for seismic design of buildings. The current method in ASCE 7-16 for developing seismic design response spectra is very complex, and it requires additional ground motion hazard analyses for many more building sites than required in previous versions of the code.

Ground motion hazard analyses are an advanced approach to develop the earthquake ground motions and response spectra needed for seismic design. They require additional geophysical testing of the soil and advanced computer modeling. The process of obtaining a ground motion hazard analysis requires geotechnical engineer with significant seismic expertise, and greatly increases the cost and time needed to complete a project.

The requirement for ground motion hazard analyses for more types of sites in Washington State also makes the job of municipal review agencies more difficult. Most jurisdictions do not have the expertise to review these analyses. Thus, they will need to contract with third-party reviewers or accept the analyses with little to no review. The first option is costly and time-consuming; the second option is dangerous and a critical life/safety issue because ground motion hazard analyses require a geotechnical engineer with significant seismic expertise to perform them correctly.

This proposal provides an alternative to the ground motion hazard analysis requirements in ASCE 7-16 by permitting an optional multi-period response spectra



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(MPRS) approach as described in ASCE 7-22. The primary inputs to this simplified method are the latitude/longitude of the site and the average shear wave velocity of the site, which can be obtained through standard geotechnical testing. The engineer would then obtain the equivalent of ground motion hazard analysis results from a U.S. Geological Survey website developed as part of the National Seismic Hazard Mapping project and adopted in ASCE 7-22. This simplified approach reduces the complexities, and it will result in more consistent, understandable estimation of ground motions for building design. This simplified process also results in ground motion parameters for seismic design that achieve the same level of risk and earthquake return periods that are assumed in ASCE 7-16.

This alternative would be allowed for all Soil Site Classes except Site Class F (e.g. liquefiable sites), meaning it could be used for most sites in the State of Washington. In addition, the MPRS may also be used to develop the code minimum spectrum when ground motion hazard analysis is required. The resulting MPRS would continue to be used within the framework of the current code, ASCE 7-16.

The use of the ASCE 7-22 MPRS as an option in lieu of the ground motion hazard analysis requirements of ASCE 7-16 will simplify the estimation of seismic forces for building design and streamline the design and review process of buildings throughout Washington.

This code change would decrease the cost of development on sites where the current building code requires ground motion hazard analysis by providing an alternative approach that does not necessitate the added costs (i.e. building owners hiring geotechnical engineer of record with significant seismic expertise to perform ground motion hazard analyses, and municipal review agencies contracting third-party ground motion hazard analysis reviewers) associated with the current building code requirements. The reduction in cost varies significantly with the building type, size, and location within the State of Washington. In addition, this proposal simplifies the review process by substituting a standardized design process (lookup seismic design values online) for a custom process (site-specific spectrum by geotechnical engineer). Plan review time will be reduced because a custom process won't need to be understood for each building. This proposal simplifies the design of new buildings, reduces the time required for design, reduces required materials, and decreases construction costs.

Code Enforcement. *The proposed amendment simplifies the review process by substituting a standardized design process (lookup seismic design values online) for a custom process (site-specific spectrum by geotechnical engineer). Plan review time will be reduced because a custom process won't need to be understood for each building.*



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Small Business Impact. *Material and design costs will decrease for small businesses.*

Housing Affordability. *Material and design costs will decrease for multi-family residential buildings.*

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

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(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

This does not differ from any federal regulations or statute applicable to the same activity.

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(1)(ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 4/4/2022

Log # [21-GP2-028](#)

Proponent and description: *Scott Neuman, Carson Baker, Julius Carreon, Patrick Lindblom, Kai Ki Mow; 2021 IBC Section 1613.4.1.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020 - Purposes—Objectives—Standards.](#)

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes throughout the state. Accordingly, this chapter is designed to effectuate the following purposes, objectives, and standards:

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- (3) To permit the use of modern technical methods, devices and improvements.
- (4) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or retard the use of new materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.
- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The 2021 IBC includes changes in a reference standard that duplicate changes made by an amendment to the Washington State Building Code. These changes relate to the construction of concrete special structural walls which are seismic force resisting elements of a building structural system and are common in commercial and multi-family residential construction. The amendment to the Washington State Building Code Section 1613.4.1 part 5 was previously needed in the building code as similar requirements weren't included in the reference standards. The 2018 IBC reference standard ACI 318-19 has added similar requirements to those of the amendment. The amendment to the Washington State Building Code should be removed for clarity.

By removing Amendment Section 1613.4.1 part 5, an engineer will be clear that the provisions and ACI 318-19 should be used directly. Without the removal of Item 5, it is unclear if the factors referenced by the amendment and the factor of the reference standards should be used together, which could result in an overestimation of design forces by a factor of 2.5. This would result in an increase in the size of special concrete walls used in new construction.

The proposal is intended to clarify the intent or application of the code, and to avoid a conflict between the model code and the existing Washington amendment. Nevertheless, the proposal is calculated to bring \$30/square foot reduction in construction cost.



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If the design requirements are misinterpreted to mean that the Ω_0 factor needs to apply to concrete wall shear twice, then costs are estimated as shown below.

Estimated cost of commercial/multi-family residential construction = \$500/sf

Estimated fraction structural cost / total construction cost = $\frac{1}{4}$

Estimated fraction special concrete walls / structural cost = $\frac{1}{6}$

Estimated increase in design forces if overstrength factor of 2.5 is duplicated = 150%

Total estimated cost = \$500/sf x $\frac{1}{4}$ x $\frac{1}{6}$ x 1.5 ~ \$30/sf

A reduction in code enforcement time is also expected as this proposal would clarify the building code which would avoid the need for design corrections.

Small Business Impact. *This proposal would reduce construction costs of building for small businesses.*

Housing Affordability. *This proposal would reduce the construction costs of multi-family residential buildings.*

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

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(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

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(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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Date: 4/7/2022

Log # [21-GP2-031](#)

Proponent and description: *Cale Ash; 2021 IBC Section 1615 Tsunami Loads.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020 - Purposes—Objectives—Standards.](#)

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- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:

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(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

This code change proposal adopts the latest Washington Department of Natural Resources tsunami design zone maps into the 2021 International Building Code. In addition, it brings forward the latest published tsunami design zone requirements contained in American Society of Civil Engineers Standard 7-22, which would otherwise be adopted as part of the 2024 International Building Code.

The proposal represents an extension of the change already incorporated into the 2018 State Building Code and incorporates the latest design requirements for select structures in the tsunami inundation zone. It does not represent an economic impact relative to the current state building code. The proposal is addressing a unique character of the state, and it is also needed to address a critical life/safety need.

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

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Date: 4/8/2022

Log # [21-GP2-094R](#)

Proponent and description: *Eric Vander Mey; 2021 IBC Section 107.2.9 Construction documents, Non-structural components.*

Compliance with RCW 34.05.328 Significant legislative rules, other selected rules

(1)(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements

[RCW 19.27.020 - Purposes—Objectives—Standards.](#)

The purpose of this chapter is to promote the health, safety and welfare of the occupants or users of buildings and structures and the general public by the provision of building codes throughout the state. Accordingly, this chapter is designed to effectuate the following purposes, objectives, and standards:

- (1) To require minimum performance standards and requirements for construction and construction materials, consistent with accepted standards of engineering, fire and life safety.
- (2) To require standards and requirements in terms of performance and nationally accepted standards.
- (3) To permit the use of modern technical methods, devices and improvements.
- (4) To eliminate restrictive, obsolete, conflicting, duplicating and unnecessary regulations and requirements which could unnecessarily increase construction costs or retard the use of new materials and methods of installation or provide unwarranted preferential treatment to types or classes of materials or products or methods of construction.
- (5) To provide for standards and specifications for making buildings and facilities accessible to and usable by physically disabled persons.
- (6) To consolidate within each authorized enforcement jurisdiction, the administration and enforcement of building codes.

(1)(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule:



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The Council is required to adopt and maintain the state building code, as provided in chapters 19.27, 19.27A, and 70.92 RCW, and the state legislature. The primary objective of the Council is to encourage consistency in the building code throughout the state of Washington and to maintain the building code consistent with the state's interest as provided in RCW 19.27.020. The statewide code adoption process is defined in WAC 51-04 and the Council bylaws. All proposals are submitted in writing on the appropriate form with the indicated supporting documentation. Each proponent must identify where a proposed amendment has an economic impact and estimate the costs and savings of the proposal on construction practices, users and/or the public, the enforcement community, and operation and maintenance. There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.

(1)(d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented:

The proposal clarifies non-structural components that require an importance factor of 1.5 and require designated seismic restraint systems per ASCE 7 need to be identified on permit drawing sets. These may include mechanical and electrical components as such as smoke control systems, stairways, emergency generators, etc.

The amendment is needed to address a critical life/safety need in Washington State. Nevertheless, it clarifies the intent or application of the code, and have no cost associated with the adoption.

(1)(e) Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection:

There are no alternatives to this procedure. If the rule is not adopted, this will be a violation of the State Law, which will affect the promotion of fire and life safety in buildings consistent with accepted standards.



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(1)(f) Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law:

The primary objective of the Council is to encourage consistency in the building code throughout the state, and to maintain the building code consistent with the state's interest. The rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

(1)(g) Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law:

The adoption and amendment of the 2021 IBC do not impose more stringent performance requirements on private entities than on public entities.

(1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter and, if so, determine that the difference is justified by the following:

This does not differ from any federal regulations or statute applicable to the same activity.

(1)(i) A state statute explicitly allows the agency to differ from federal standards; or

(1)(ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated under (a) of this subsection; and

(1)(iii) Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same activity or subject matter.



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3. Modifications Made to CR-102

3.1 Modifications Made to Proposals

3.1.1

Log # [21-GP1-63R](#)

Proponent and description: *Todd Beyreuther; 2021 IBC Sections 2304.11.2.1, 2304.11.2.2, 2304.11.3.1, 2304.11.4.1 - prescriptive thickness requirements of cross-laminated timber.*

The proposal was modified after the public comment period and the public hearings and adopted by the Council. An editorial correction was made to Section 2304.11.3.1, the phrase “discussion at committee level” was inadvertently added to the CR-102 code language. There is no intended change in regulatory effect; there is no need for modifications to the preliminary cost benefit analysis.

3.1.2

Log # [21-GP2-017](#)

Proponent and description: *Julius Carreon; 2021 IBC Chapter 35 Referenced Standards (ASCE/SEI).*

The proposal was modified after the public comment period and the public hearings and adopted by the Council. Additional supplements are available for the ASCE/SEI 7-16. The modification includes the additional supplements by reference. There is no intended change in regulatory effect; there is no need for modifications to the preliminary cost benefit analysis.

3.1.3

Log # [21-GP2-031](#)

Proponent and description: *Cale Ash; 2021 IBC Section 1615 Tsunami Loads.*

The proposal was modified after the public comment period and the public hearings and adopted by the Council. The modified version replaced the related code change proposal submitted by the same designated contact person on April 7, 2022. Since that time, Washington Department of Natural Resources (WA DNR) has finalized the



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development of tsunami design zone maps for all coastal areas of the state. This revised proposal adopts these latest tsunami hazard maps into the state building code and brings forward the latest published tsunami design zone requirements contained in American Society of Civil Engineers Standard 7-22, which would otherwise be adopted as part of the 2024 International Building Code. There is no intended change in regulatory effect; there is no need for modifications to the preliminary cost benefit analysis.

3.2 Editorial Modifications

The following modifications are made to correct minor errors in the code language or to correct incorrect references. Alterations are minor in nature and do not have any intended change in regulatory effect.

3.2.1

IBC 2107.2 This section was removed, and the WAC number has been reserved. The amendment is no longer necessary, it is now included in the model code language.