



STATE OF WASHINGTON
STATE BUILDING CODE COUNCIL

May 2018
Log No. _____

1. State Building Code to be Amended:

International Building Code
ICC ANSI A117.1 Accessibility Code
International Existing Building Code
International Residential Code
International Fire Code
Uniform Plumbing Code

International Mechanical Code
International Fuel Gas Code
NFPA 54 National Fuel Gas Code
NFPA 58 Liquefied Petroleum Gas Code
Wildland Urban Interface Code
For the Washington State Energy Code, please see
specialized [energy code forms](#)

Section(s): **WAC 51-50-1615**
(e.g.: Section: R403.2)

Title: **Tsunami Amendment Updates**
(e.g: Footings for wood foundations)

2. Proponent Name (Specific local government, organization or individual):

Proponent: **Jonathan Siu (self); Daniel Eungard (Geologist—Tsunami Hazards; Washington Geological Survey)**

Title:

Date: **9/10/2024**

3. Designated Contact Person:

Name: **Jonathan Siu**
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Office Phone: **(206) 888-7331**

Cell: **same**

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- 4. Proposed Code Amendment.** Reproduce the section to be amended by underlining all added language, striking through all deleted language. Insert new sections in the appropriate place in the code in order to continue the established numbering system of the code. If more than one section is proposed for amendment or more than one page is needed for reproducing the affected section of the code, additional pages may be attached.

Clearly state if the proposal modifies an existing amendment or if a new amendment is needed. If the proposal modifies an **existing amendment**, show the modifications to the existing amendment by underlining all added language and striking through all deleted language. If a new amendment is needed, show the modifications to the **model code** by underlining all added language and striking through all deleted language.

Code(s) WSBC/IBC Section(s) 1615

Enforceable code language must be used.

Amend section to read as follows (proposal uses WAC 51-50-1615 as the baseline):

WAC 51-50-1615 Tsunami loads.

1615.1 General. The design and construction of Risk Category III and IV buildings and structures located in the Tsunami Design Zones shall be in accordance with Chapter 6 of ~~ASCE 7-22~~ ASCE 7, except as modified by this code. ~~Wherever ASCE 7 is referenced herein, it shall refer to ASCE 7-22, within the extent of ASCE 7 Chapter 6 and WAC 51-50-1615.~~

Exception: Temporary structures complying with Section 3103.6.1.6.

USER NOTE: The intent of the Washington state amendments to ASCE 7 Chapter 6 (Tsunami Loads and Effects) is to require use of the Washington Tsunami Design Zone maps to determine inundation limits, i. e., when a site is within a tsunami design zone. The Washington state department of natural resources has parameters for tsunami inundation depth and flow velocity available for all of Washington's coastal waters and tidally influenced riverine systems (WA-TDZ). These parameters are required to be used in lieu of ASCE Tsunami Design Geodatabase, and as a basis for comparison in the probabilistic tsunami hazard analysis in this chapter.

1615.2 Modifications to ASCE 7. The text of Chapter 6 of ASCE 7 shall be modified as indicated in this section.

1615.2.3 ASCE 7 Section 6.2. Modify ASCE 7 Section 6.2 definitions to read as follows:

ASCE TSUNAMI DESIGN GEODATABASE: Not Adopted.

USER NOTE: The ASCE tsunami design geodatabase is not adopted for design purposes in Washington state.

MAXIMUM CONSIDERED TSUNAMI: A probabilistic tsunami having a two percent probability of being exceeded in a 50-year period or a 2,475- year mean recurrence, or a deterministic assessment considering the maximum tsunami that can reasonably be expected to affect a site.

TSUNAMI DESIGN ZONE MAP: The Washington Tsunami Design Zone maps (WA-TDZ) designating the ~~potential~~ design horizontal inundation limit of the Maximum Considered Tsunami found at <https://www.dnr.wa.gov/wa-tdz>.

1615.2.5 ASCE 7 Section 6.5.1. ~~Add new second paragraph to~~ Replace the first paragraph and modify the second paragraph of ASCE 7 Section 6.5.1 to read as follows:

6.5.1 Tsunami Risk Category II and III buildings and other structures. The Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics at a Tsunami Risk Category II or III building or other structure shall be determined by the WA-TDZ maps. Those parameters shall be used as the Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics in lieu of the Energy Grade Line Analysis in Section 6.6.

The site-specific Probabilistic Tsunami Hazard Analysis (PTHA) in Section 6.7 shall be permitted as an alternate to the ~~Energy Grade Line Analysis~~ values found on the WA-TDZ maps. Site-specific velocities determined by PTHA shall be subject to the limitation in Section 6.7.6.8.

~~**1615.2.6 ASCE 7 Section 6.5.1.1.** Modify the first paragraph of ASCE 7 Section 6.5.1.1 to read as follows:~~

~~**6.5.1.1 Runup evaluation for areas where no map values are given.** For Tsunami Risk Category II and III buildings and other structures where no mapped inundation limit is shown in the Tsunami Design Zone map, the ratio of tsunami runup elevation above Mean High Water Level to Offshore Tsunami Amplitude, R/H_T , shall be permitted to be determined using the surf similarity parameter ξ_{100} , according to Eqs. (6.5-2a, b, c, d, or e) and Fig. 6.5-1.~~

1615.2.12 ASCE 7 Section 6.7.5.3. Modify ASCE 7 Section 6.7.5.3 Items 1(b) and 1(c) to read as follows:

(b) The mean value of the computed offshore tsunami amplitudes is at least 85 percent of the mean value for the coinciding offshore tsunami amplitude data of the WA-TDZ maps.

(c) The values of the computed offshore tsunami wave amplitude are not less than 75 percent of the coinciding offshore tsunami amplitude values of the WA-TDZ maps.

- 5. Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.** Specifically note any impacts or benefits to business, and specify construction types, industries and services that would be affected. Finally, please note any potential impact on enforcement such as special reporting requirements or additional inspections required.

This amendment cleans up the Washington State amendments in IBC Section 1615, which modifies the tsunami provisions in ASCE 7. Note that the revisions shown above are only the changes being proposed to WAC 51-50-1615. All other sections/provisions in WAC 51-50-1615 are intended to remain without further amendment. A copy of the entire section including the strikethroughs and underlines above is attached (see Attachment A).

In the last cycle, WAC 51-50-1615 was amended to pre-adopt the tsunami provisions in ASCE 7-22, since the 2021 IBC only adopted ASCE 7-16. Some of these amendments are no longer necessary because the 2024 IBC adopts ASCE 7-22 by reference. The changes are described in detail below, but the main purpose of these revisions is to update WAC 51-50-1615 for consistency with ASCE 7-22, while also cleaning up some of the adopting language.

- §1615.1. The revisions to the main paragraph delete the unnecessary references to ASCE 7-22. The exception is new in the 2024 IBC but is shown as underlined because it is not in WAC 51-50-1615.
- §1615.2. The new amendment to the definition of Tsunami Design Zone Map replaces “potential” with “design” in order to more accurately reflect what the maps represent. That is, the inundation zone shown on the maps is a design parameter for use by the designer, not the largest possible inundation area (which is how “potential” could be interpreted).
 - Note also that “https://” has been added to the web page URL for consistency with how it is referenced in the other sections.
- §1615.2.5
 - The revision in the instruction line from “add new second paragraph” to “replace the first paragraph” is editorial. It is a more accurate representation of what is intended, since it is not the intent to keep the text of the existing first paragraph in ASCE 7-22 Section 6.5.1.
 - The additional revision in the instruction line (“and modify the second paragraph”) points to the new revision to the second paragraph of ASCE 7-22 Section 6.5.1 (next bullet).
 - The existing amendment in the first paragraph of Section 6.5.1 essentially eliminates the use of the Energy Grade Line method of analysis to determine the design parameters at the building site—the WA-TDZ maps are to be used instead. The new revision to the second paragraph corrects an omission/error in WAC 51-50-1615 that still refers to the Energy Grade Line method, and more correctly states that PTHA (a performance-based design method) is allowed to be used in lieu of the data found in the WA-TDZ maps.
- §1615.2.6. This section was added to WAC 51-50-1615 as part of the pre-adoption of ASCE 7-22 provisions for tsunamis. It is no longer needed in WAC 51-50-1615, since the language is contained in ASCE 7-22.
- §1615.2.12. The revisions to the instruction line are editorial in nature. They are merely more accurate pointers to the items being amended.

6. Specify what criteria this proposal meets. You may select more than one.

The amendment is needed to address a critical life/safety need.

The amendment clarifies the intent or application of the code.

The amendment is needed to address a specific state policy or statute.

The amendment is needed for consistency with state or federal regulations.

The amendment is needed to address a unique character of the state.

The amendment corrects errors and omissions.

7. Is there an economic impact: No

If no, state reason: This amendment only clarifies the application of the code.

If yes, provide economic impact, costs and benefits as noted below in items a – f.

- Life Cycle Cost.** Use the OFM Life Cycle Cost Analysis tool to estimate the life cycle cost of the proposal using one or more typical examples. Reference these Instructions; use these Inputs. Webinars on the tool can be found Here and Here). If the tool is used, submit a copy of the excel file with your proposal submission. If preferred, you may submit an alternate life cycle cost analysis.
- Construction Cost.** Provide your best estimate of the construction cost (or cost savings) of your code change proposal.

\$Click here to enter text./square foot

(For residential projects, also provide \$Click here to enter text./ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

- c. ***Code Enforcement.*** List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:
- d. ***Small Business Impact.*** Describe economic impacts to small businesses:
- e. ***Housing Affordability.*** Describe economic impacts on housing affordability:
- f. ***Other.*** Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

Please send your completed proposal to: sbcc@des.wa.gov

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.

Attachment A – WAC 51-50-1615 Tsunami Loads

1615.1 General. The design and construction of Risk Category III and IV buildings and structures located in the Tsunami Design Zones shall be in accordance with Chapter 6 of ~~ASCE 7-22~~ **ASCE 7**, except as modified by this code. ~~Wherever ASCE 7 is referenced herein, it shall refer to ASCE 7-22, within the extent of ASCE 7 Chapter 6 and WAC 51-50-1615.~~

Exception: *Temporary structures complying with Section 3103.6.1.6.*

USER NOTE: The intent of the Washington state amendments to ASCE 7 Chapter 6 (Tsunami Loads and Effects) is to require use of the Washington Tsunami Design Zone maps to determine inundation limits, i. e., when a site is within a tsunami design zone. The Washington state department of natural resources has parameters for tsunami inundation depth and flow velocity available for all of Washington's coastal waters and tidally influenced riverine systems (WA-TDZ). These parameters are required to be used in lieu of ASCE Tsunami Design Geodatabase, and as a basis for comparison in the probabilistic tsunami hazard analysis in this chapter.

1615.2 Modifications to ASCE 7. The text of Chapter 6 of ASCE 7 shall be modified as indicated in this section.

1615.2.1 ASCE 7 Section 6.1.1. Replace the third paragraph of ASCE 7 Section 6.1.1 with the following and remove the associated exception:

The Tsunami Design Zone shall be determined using the Washington Tsunami Design Zone maps (WA-TDZ). The WA-TDZ maps are available at <https://www.dnr.wa.gov/wa-tdz>.

1615.2.2 ASCE 7 Section 6.1.1. Add new fifth paragraph and user note to ASCE 7 Section 6.1.1 to read as follows:

Whenever a Tsunami Design Zone or Fig. 6.1-1 is referenced in ASCE 7 Chapter 6, the WA-TDZ maps shall be used.

USER NOTE: Tsunami design zone and design parameters may be obtained from the Washington state department of natural resources. See <https://www.dnr.wa.gov/wa-tdz>.

1615.2.3 ASCE 7 Section 6.2. Modify ASCE 7 Section 6.2 definitions to read as follows:

ASCE TSUNAMI DESIGN GEODATABASE: Not Adopted.

USER NOTE: The ASCE tsunami design geodatabase is not adopted for design purposes in Washington state.

MAXIMUM CONSIDERED TSUNAMI: A probabilistic tsunami having a two percent probability of being exceeded in a 50-year period or a 2,475- year mean recurrence, or a deterministic assessment considering the maximum tsunami that can reasonably be expected to affect a site.

TSUNAMI DESIGN ZONE MAP: The Washington Tsunami Design Zone maps (WA-TDZ) designating the ~~potential design~~ horizontal inundation limit of the Maximum Considered Tsunami found at <https://www.dnr.wa.gov/wa-tdz>.

1615.2.4 ASCE 7 Section 6.2. Add new definitions to ASCE 7 Section 6.2 to read as follows:

WASHINGTON TSUNAMI DESIGN ZONE MAP (WA-TDZ): The Washington department of natural resources maps of potential tsunami inundation limits for the Maximum Considered Tsunami, designated as follows:

Columbia River	DOGAMI SP-51 (L1 scenario) adopted by WA DNR
Outer Coast and Strait area	MS 2022-01
Port Townsend	MS 2018-03 (partially superseded by MS 2022-01)
Puget Sound	MS 2021-01 (revised 2022)
San Juan Islands	MS 2016-01 (partially superseded on its eastern edge by MS 2021-01)
Southern Washington	MS 2018-01 Coast

The Washington state department of natural resources geodatabase of design parameters for tsunami inundation depth, flow velocity, offshore tsunami amplitude, predominant period, and tsunami design zone maps for a maximum considered tsunami is available at the Washington TDZ website (<https://www.dnr.wa.gov/wa-tdz>).

1615.2.5 ASCE 7 Section 6.5.1. ~~Add new second paragraph to~~ Replace the first paragraph and modify the second paragraph of ASCE 7 Section 6.5.1 to read as follows:

6.5.1 Tsunami Risk Category II and III buildings and other structures. The Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics at a Tsunami Risk Category II or III building or other structure shall be determined by the WA-TDZ maps. Those parameters shall be used as the Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics in lieu of the Energy Grade Line Analysis in Section 6.6.

The site-specific Probabilistic Tsunami Hazard Analysis (PTHA) in Section 6.7 shall be permitted as an alternate to the Energy Grade Line Analysis values found on the WA-TDZ maps. Site-specific velocities determined by PTHA shall be subject to the limitation in Section 6.7.6.8.

~~**1615.2.6 ASCE 7 Section 6.5.1.1.** Modify the first paragraph of ASCE 7 Section 6.5.1.1 to read as follows:~~

~~**6.5.1.1 Runup evaluation for areas where no map values are given.** For Tsunami Risk Category II and III buildings and other structures where no mapped inundation limit is shown in the Tsunami Design Zone map, the ratio of tsunami runup elevation above Mean High Water Level to Offshore Tsunami Amplitude, R/H_T , shall be permitted to be determined using the surf similarity parameter ξ_{100} , according to Eqs. (6.5-2a, b, c, d, or e) and Fig. 6.5-1.~~

1615.2.7 ASCE 7 Section 6.5.2. Modify the paragraph and the exception, to read as follows:

6.5.2 Tsunami Risk Category IV buildings and other structures. A site-specific Probabilistic Tsunami Hazard Analysis (PTHA) shall be performed for Tsunami Risk Category IV buildings and other structures. Site-specific velocities determined by site-specific PTHA determined to be less than the design flow velocities determined from the WA-TDZ maps shall be subject to the limitation in Section 6.7.6.8. Site-specific velocities determined to be greater than the WA-TDZ map velocities shall be used.

EXCEPTION: For structures other than Tsunami Vertical Evacuation Refuge Structures , a site-specific Probabilistic Tsunami Hazard Analysis need not be performed where the inundation depth determined from the WA-TDZ maps is determined to be less than 12 ft (3.66 m) at any point within the location of the Tsunami Risk Category IV structure.

1615.2.8 ASCE 7 Section 6.6.1. Replace ASCE 7 Section 6.6.1 to read as follows:

6.6.1 Maximum inundation depth and flow velocities. The maximum inundation depths and flow velocities associated with the stages of tsunami flooding are determined by the WA-TDZ maps. Flow velocity for design purposes shall not be taken as less than 10 ft/s (3.0 m/s) and need not be taken as greater than the lesser of $1.5(gh_{max})^{1/2}$ and 50 ft/s (15.2 m/s).

1615.2.9 ASCE 7 Section 6.7. Replace ASCE 7 Section 6.7 with the following and add a user note:

When required by Section 6.5, the inundation depths and flow velocities shall be determined by site-specific inundation studies complying with the requirements of this section. Site-specific analyses shall use an integrated generation, propagation, and inundation model that replicates the given offshore tsunami waveform amplitude and period from the seismic sources given in Section 6.7.2.

USER NOTE: WA-TDZ maps are based on an integrated generation, propagation, and inundation model replicating waveforms from the seismic sources specific to Washington state. See <https://www.dnr.wa.gov/wa-tdz>.

1615.2.10 ASCE 7 Table 6.7-2. Modify ASCE 7 Table 6.7-2 to read as follows:

Table 6.7-2 Maximum Moment Magnitude	
Subduction Zone	Moment Magnitude M_{wmax}
Alaska-Aleutian	9.2
Cascadia	9.0
Chile-Peru	9.5
Izu-Bonin-Mariana	9.0
Kamchatka-Kurile and Japan Trench	9.4

1615.2.11 ASCE 7 Section 6.7.5.1. Modify ASCE 7 Section 6.7.5.1 Item 4, Item 5, and Item 6 to read as follows:

6.7.5.1 Offshore tsunami amplitude for distant seismic sources. Offshore tsunami amplitude shall be probabilistically determined in accordance with the following:

4. The extent of offshore tsunami amplitude points considered for the site shall include the following:

(a) For outer coast sites, the extent shall include points within at least 40 mi (64.4 km) but not exceeding 50 mi (80.5 km) of projected length along the coastline, centered on the site within a tolerance of plus or minus 6 mi (9.7 km);

(b) Reserved;

(c) For sites within bays or inland waterways (such as the Strait of Juan de Fuca), the designated center of the computed offshore tsunami amplitude points shall be taken offshore of the mouth of the bay or waterway centered in accordance with criteria (a) above;

(d) For island locations where the projected width of the island is less than 40 mi (64.4 km), it shall be permitted to consider the extent of offshore tsunami amplitude points corresponding to the projected width of the island. Shorter extents of offshore tsunami amplitude points shall be permitted for island locations, but shall not be less than 10 mi (16.1 km);

(e) In addition to the above, the tsunami source development and inundation modeling are subject to an independent peer review by a tsunami modeler approved by the Authority Having Jurisdiction, who shall present a written report to the Authority Having Jurisdiction as to the hazard consistency of the modeling with the requirements of Section 6.7.

5. The mean value of the computed offshore tsunami wave amplitudes shall be not less than 100 percent of the mean value for the coinciding offshore tsunami amplitude data given by the WA-TDZ maps.

6. The individual values of the computed offshore tsunami wave amplitude shall be not less than 80 percent of the coinciding offshore tsunami amplitude values given by the WA-TDZ maps.

1615.2.12 ASCE 7 Section 6.7.5.3. Modify ASCE 7 Section 6.7.5.3 Items 1(b) and 1(c) to read as follows:

(b) The mean value of the computed offshore tsunami amplitudes is at least 85 percent of the mean value for the coinciding offshore tsunami amplitude data of the WA-TDZ maps.

(c) The values of the computed offshore tsunami wave amplitude are not less than 75 percent of the coinciding offshore tsunami amplitude values of the WA-TDZ maps.

1615.2.13 ASCE 7 Section 6.7.6.2. Modify ASCE 7 Section 6.7.6.2 and add a user note to read as follows:

6.7.6.2 Seismic subsidence before tsunami arrival. Where the seismic source is a local earthquake event, the Maximum Considered Tsunami inundation shall be determined for an overall elevation subsidence value directly computed for the seismic source mechanism.

USER NOTE: WA-TDZ maps include computed subsidence and uplift (where applicable) in the inundation results. See <https://www.dnr.wa.gov/wa-tdz>.

1615.2.14 ASCE 7 Figure 6.7-3. Remove Figure 6.7-3 and the associated note.

1615.2.15 ASCE 7 Section 6.8.9. Modify the first sentence of ASCE 7 Section 6.8.9 to read as follows:

6.8.9 Seismic effects on the foundations preceding maximum considered tsunami. Where designated in the Tsunami Design Zone map as a site subject to a tsunami from a local earthquake, the structure shall be designed for the preceding coseismic effects.