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, 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.

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 horizontal inundation limit of the Maximum Considered Tsunami found at 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 Coast	MS 2018-01

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 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.

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/HT, shall be permitted to be determined using the surf similarity parameter ξ100, 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}
Alaskan-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 6.7.5.3.1(b) and (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.

[Statutory Authority: RCW 19.27.031, 19.27.074, and 19.27.540. WSR 23-02-073, 23-12-103, and 23-20-023, § 51-50-1615, filed 1/4/23, 6/7/23, and 9/25/23, effective 3/15/24. Statutory Authority: RCW 19.27.031 and 19.27.074. WSR 21-12-075, § 51-50-1615, filed 5/28/21, effective 6/28/21.]