

2021 Virginia Construction Code

CHAPTER 16 STRUCTURAL DESIGN

SECTION 1611 RAIN LOADS

1611.1 Design rain loads.

Each portion of a roof shall be designed to sustain the *load* of rainwater as per the requirements of Chapter 8 of ASCE 7. The design rainfall shall be based on the 100-year 15-minute duration event, or on other rainfall rates determined from approved local weather data. Alternatively, a design rainfall of twice the 100-year hourly rainfall rate indicated in Figures 1611.1(1) through 1611.1(5) shall be permitted.

$$R = 5.2(d_s + d_h)$$

For SI: $R = 0.0098(d_s + d_h)$

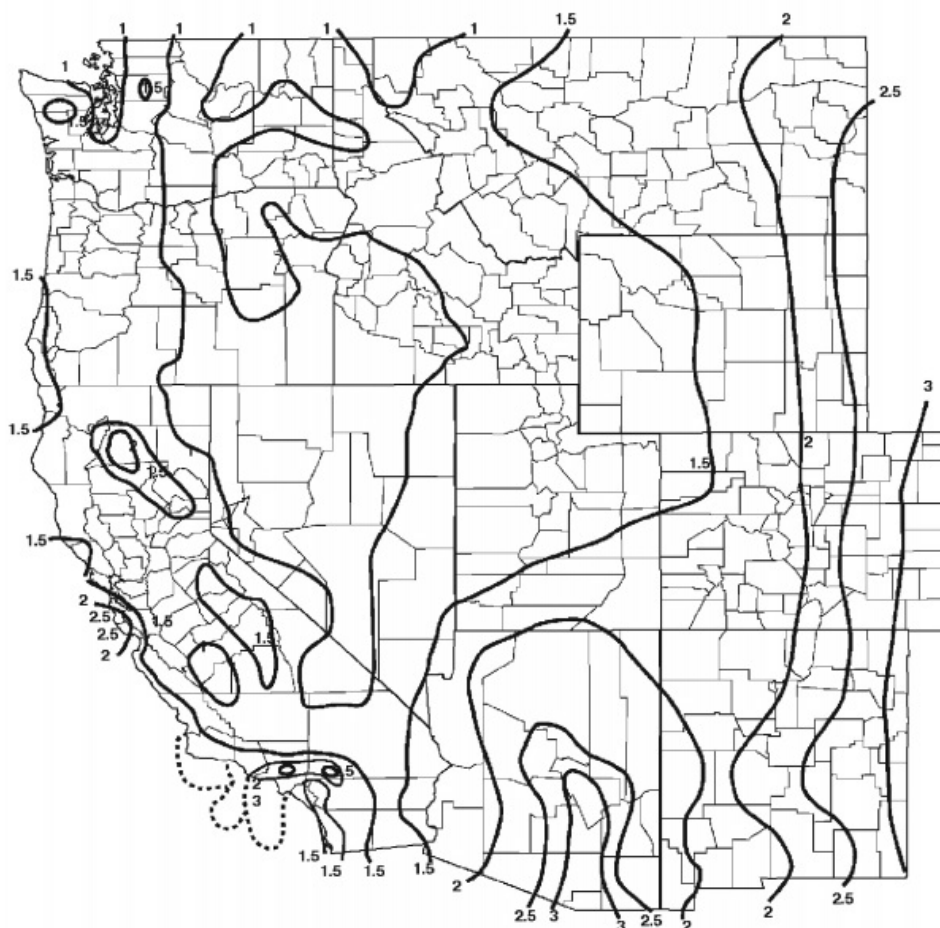
(Equation 16-19)

where:

d_h = Additional depth of water on the undeflected roof above the inlet of secondary drainage system at its design flow (in other words, the hydraulic head), in inches (mm).

d_s = Depth of water on the undeflected roof up to the inlet of secondary drainage system when the primary drainage system is blocked (in other words, the static head), in inches (mm).

R = Rain load on the undeflected roof, in psf (kN/m²). Where the phrase “undeflected roof” is used, deflections from loads (including *dead loads*) shall not be considered when determining the amount of rain on the roof.



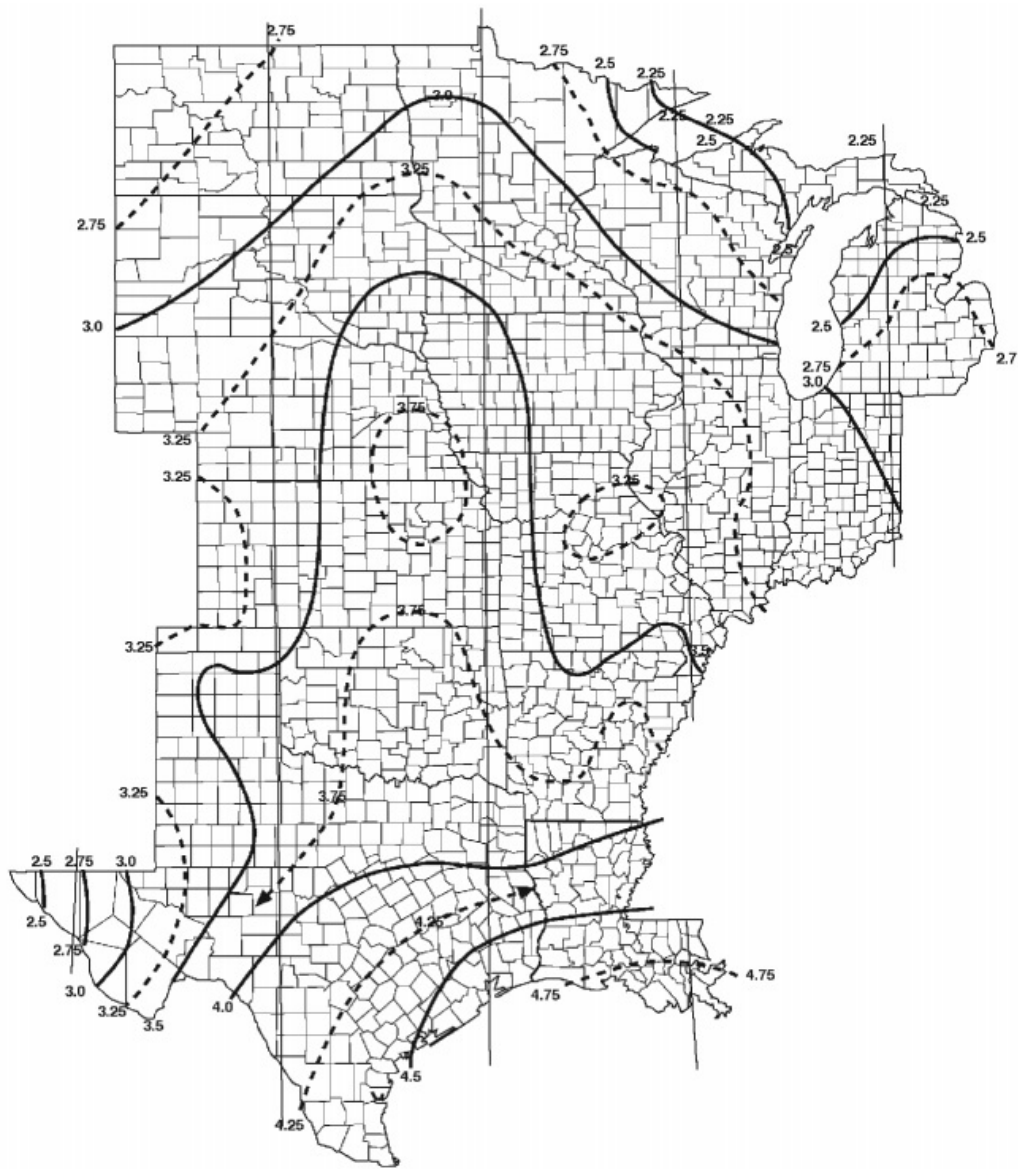
For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(1)
100-YEAR, 1-HOUR RAINFALL (INCHES) WESTERN UNITED STATES

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For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(2)
100-YEAR, 1-HOUR RAINFALL (INCHES) CENTRAL UNITED STATES

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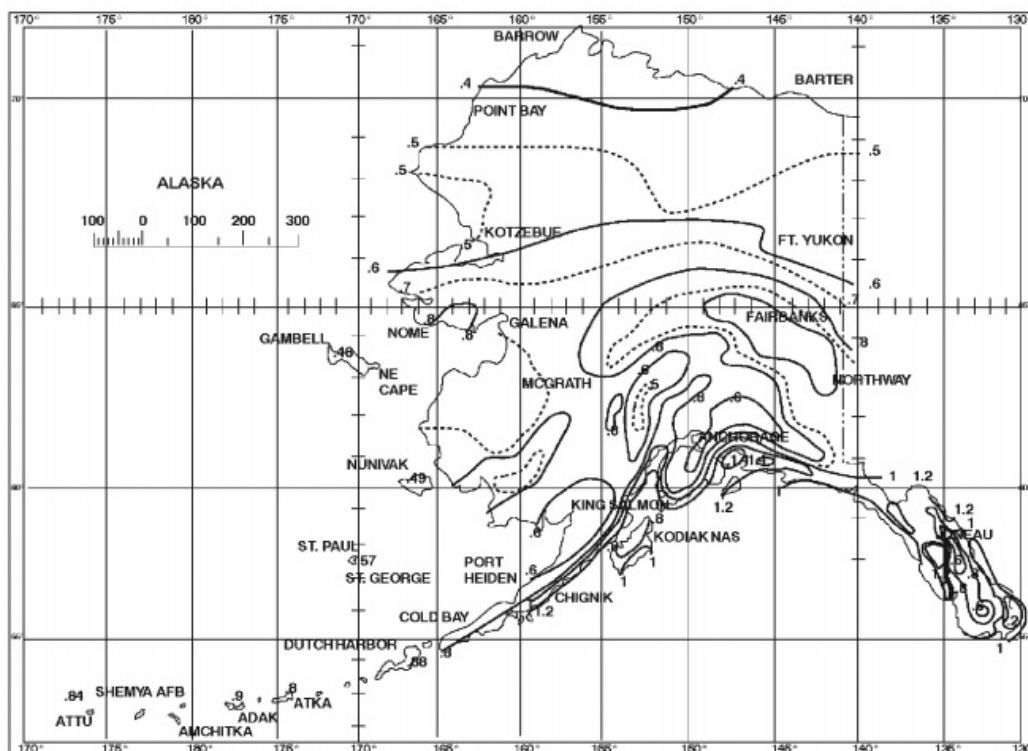
For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(3)
100-YEAR, 1-HOUR RAINFALL (INCHES) EASTERN UNITED STATES

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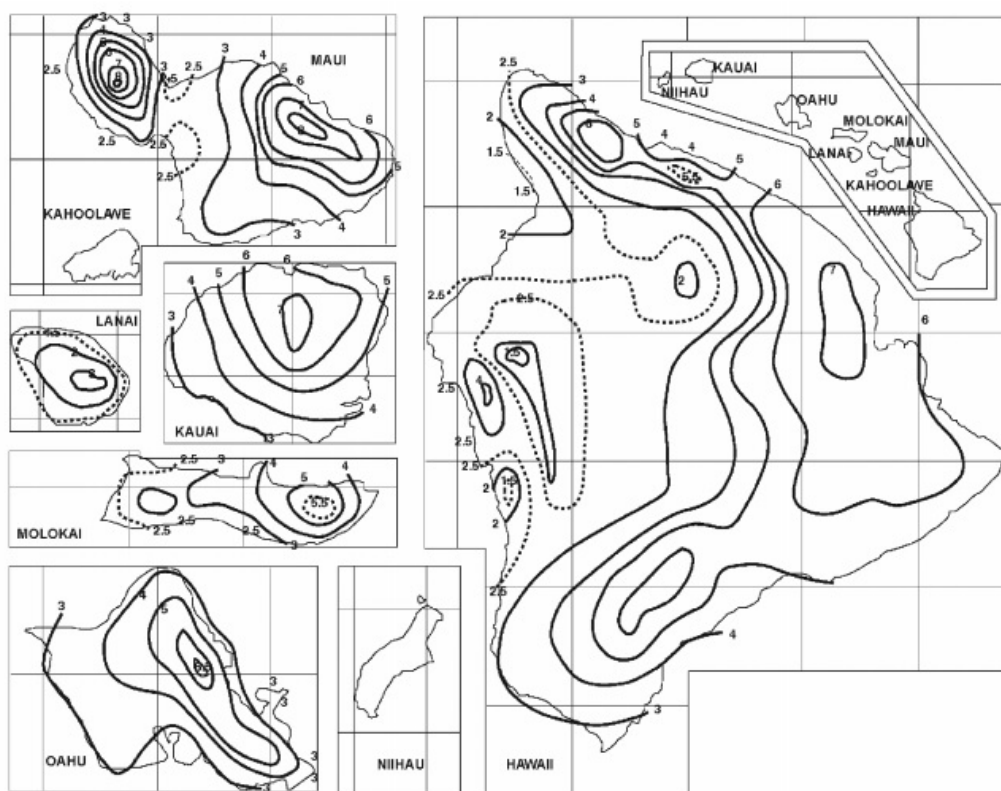
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For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(4)
100-YEAR, 1-HOUR RAINFALL (INCHES) ALASKA



For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(5)

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100-YEAR, 1-HOUR RAINFALL (INCHES) HAWAII

1611.2 Ponding instability.

Susceptible bays of roofs shall be evaluated for ponding instability in accordance with [Chapters 7 and 8](#) of [ASCE 7](#).

1611.3 Controlled drainage.

Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the *load* of rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform *load* caused by water that rises above the inlet of the secondary drainage system at its design flow determined from [Section 1611.1](#). Such roofs shall be checked for ponding instability in accordance with [Section 1611.2](#).