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TECHNICAL BULLETIN

Code Effective Date: **May 12, 2020**[1]

Source Document: **19 NYCRR Part 1220 – Residential Construction**
19 NYCRR Part 1240 – State Energy Conservation Construction Code[2]

Topic: **Requirements for Completing Table R301.2(1) in the 2020 Residential Code of New York State**

This document is intended to assist an Authority Having Jurisdiction (AHJ) in establishing the additional design criteria as required by Section R301.2 of the 2020 Residential Code of New York State (2020 RCNYS) and in making the required data available to applicants and design professionals.

Section R301 of the 2020 RCNYS specifies the minimum design criteria required for buildings and structures built in accordance with the provisions of the 2020 RCNYS. Section R301.2 details the climatic and geographic design criteria necessary for some of the required loads and requires that "*additional criteria shall be established by the local jurisdiction and set forth in Table R301.2(1)*." A copy of Table R301.2(1) of the 2020 RCNYS is provided as an attachment to this document for reference. Detailed guidance for each of the entries in Table R301.2(1) is found below.

> **Note:** For AHJs that span multiple municipalities (Cities, Towns, or Villages), the data required should be filled out for each municipality individually. Additionally, this is not intended to be a design guide or an all-inclusive review of structural loads or climatic design criteria. Code users should review all applicable sections of the Uniform Code and Energy Code specific to each building or structure.

Ground Snow Load

The entry in the "ground snow load" column is used to determine *"the design snow loads for roofs,"* [see Footnote "o" to Table R301.2(1)] which is one of several loads that must be used for overall structural design. Sections R301.2.3 and R301.6 of the 2020 RCNYS rely on this value to determine the design path.

To determine the ground snow load value, AHJs should find their location on the map titled *"Ground Snow Loads, P_g, For New York State"* [Figure R301.2(6) of the 2020 RCNYS], select the applicable load and insert the load in the table.

While the values provided in Figure R301.2(6) of the 2020 RCNYS depict the ground snow load for different regions of the State, it may be difficult to determine the values for municipalities located on or near the lines separating the regions. For such municipalities where it is difficult to determine the

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[1] The "Code Effective Date" for this Technical Bulletin is May 12, 2020, which is the effective date of the 2020 update of the New York State Uniform Fire Prevention and Building Code (the Uniform Code).

[2] The Uniform Code is contained in Title 19 of the Official Compilation of Codes, Rules and Regulations of the State of New York Parts 1220 through 1228 and the publications incorporated by reference into those Parts, including, but not limited to the 2020 NYS specific code books which are based on the 2018 International Code Council books. The Energy Code is contained in Title 19 of the Official Compilation of Codes, Rules and Regulations of the State of New York Part 1240 and the publications incorporated by reference into that Part, including, but not limited to the 2020 NYS specific code book which is based on the 2018 International Energy Code and the publication entitled *ANSI/ASHRAE/IES Standard 90.1-2016, Energy Standard for Buildings Except Low-Rise Residential Buildings* published by American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.

applicable value, it is recommended to select the more restrictive of the two values. For example, in a municipality where the Figure values can be read as either 40 or 50 pounds, the 50 pounds value is more restrictive and should be used for the entire municipality. For sites at elevations above 1,000 feet, footnote "o" to Figure R301.2(6) indicates to increase the ground snow load from the mapped value by 2 psf for every 100 feet above 1,000 feet.[3]

Upon receipt of a building permit application, the code enforcement official (CEO) should confirm that the design accounts for any required adjustment to the ground snow load based on the elevation of the individual building site. For example, for a building site located at a 1,200 feet elevation, the ground snow load is 4 psf above the mapped value.

Wind Design Criteria

Section R301.2.1 of the 2020 RCNYS requires the use of ultimate design wind speed, with several limitations, restrictions, and additional criteria as detailed in the speed, topographic effects, special wind region, and windborne debris zone sections below.

Section R301.2.1.1 provides that, with a few exceptions, "*the wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(5)B".* According to Figure R301.2(5)B, there are no regions within NYS that require wind design so the wind provisions of the 2020 RCNYS are applicable to all construction.

Speed

The location-specific ultimate wind "speed" is found on Figure R301.2(5)A titled *"Ultimate Design Wind Speeds."* AHJs should select the appropriate value from the Figure and place it in Table 301.2(1). Similar to ground snow load, for areas that fall on or near the lines, the more restrictive value should be selected.

During plan review and permitting, the CEO should verify that, where applicable, the following has been taken into consideration:

- According to footnote "d" to Table 301.2(1) of the 2020 RCNYS, the *"wind exposure category* [A, B, or C] *shall be determined on a site-specific basis in accordance with Section R301.2.1.4."*
- Basic wind speed *"values are nominal design 3-second gust wind speeds in miles per hour at 33 ft above ground for Exposure C"* (see definition of Basic Wind Speed in Chapter 2 of the 2020 RCNYS).
- Section R301.2.1.3 adds that *"where referenced documents are based on nominal design wind speeds and do not provide the means for conversion between ultimate design wind speeds and nominal design wind speeds, the ultimate design wind speeds, V_{ult}, of Figure R301.2(5)A shall be converted to nominal design wind speeds, V_{asd}, using Table R301.2.1.3."*

Topographic effects

According to footnote "k" to Table 301.2(1), *'where there is local historical data documenting structural damage to buildings caused by wind speed-up effects, the jurisdiction shall fill in this part of the table with "YES".'* Additional information that may be helpful to the CEO during plan review and permitting is as follows:

- A "YES" response might trigger the applicant or designer to comply with the provisions of Section R301.2.1.5 within the parameters set on that Section.
- When Section R301.2.1.5.1 of the 2020 RCNYS is employed, rather than ASCE 7, the resulting calculations may lead to the modification of the ultimate design wind speed for the site.

Special Wind region

According to footnote "l" to Table R301.2(1), AHJs should find their jurisdiction on the map in Figure R301.2(5)A and if the jurisdiction is within a "special wind region," fill in this part of the table with "YES." If the jurisdiction is not within a "Special Wind Region" per the map, and no other known local historical data documenting unusual wind conditions is available, indicate "NO" in the table. If the table is provided with an entry of "YES," the applicant or design professional will be required to take special consideration in the

[3] 19 NYCRR Section 1220.3 (a) amends footnote "o" to Table 301.2(1) of the printed version of the 2020 RCNYS to read as follows "The ground snow loads to be used in determining the design snow loads for roofs are given in Figure R301.2(6) for sites at elevations up to 1,000 feet. Sites at elevations above 1,000 feet shall have their ground snow load increased from the mapped value by 2 psf for every 100 feet above 1,000 feet."

design of a building or structure at this location, and the AHJ should be prepared to provide any available data relating to the unusual wind conditions to the applicant or designer.

Windborne debris zone

AHJs should enter a value of "YES" for "windborne debris zone" if their jurisdiction meets the definition of *windborne debris region* provided in Chapter 2 of the 2020 RCNYS:

> *Areas within hurricane-prone regions located in accordance with one of the following*:
>
> > *1. Within 1 mile (1.61 km) of the coastal mean high-water line where the ultimate design wind speed, V_{ult}, is 130 mph (58 m/s) or greater.*
> >
> > *2. In areas where the ultimate design wind speed, V_{ult}, is 140 mph (63.6 m/s) or greater; or Hawaii.*

An entry of "YES" triggers applicants and designers to comply with Section R301.2.1.2 of the 2020 RCNYS for the protection of openings from windborne debris.

Seismic Design Category

Footnote "f" to Table 301.2(1) indicates that the "seismic design category" is determined in accordance with Section R301.2.2.1, which provides that, *"buildings shall be assigned a seismic design category in accordance with Figure R301.2(2)."* Based on Figure R301.2(2), the seismic design categories present in NYS are A, B, and C. AHJs should find their jurisdiction on the Figure and make the appropriate entry in the Table. Similar to ground snow load, for areas that fall on or near the lines, the more restrictive value should be selected.

Subject to damage from - Weathering

The "weathering" column shall be filled in with the weathering index obtained from Figure R301.2(4). According to the figure, NYS is completely within the "Severe" weathering probability category. Additional information that may be helpful to the CEO during plan review and permitting is as follows:

- Footnote "a" indicates that "*where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern."*
- Weathering impacts concrete compressive strength and air entrainment of concrete per Section R402.2 of the 2020 RCNYS.

Subject to damage from - Frost Line Depth

The local jurisdiction shall provide the minimum depth of footing below finish grade. The considerations that a local jurisdiction can use when developing its "frost line depth" include, but are not limited to, air freezing index, soil type, water table depth, local historical data, and field experience.

Subject to damage from - Termite

In accordance with Table 301.2(1) footnote "c," the AHJ shall complete this column based on local history of subterranean "termite" damage. The map in Figure R301.2(7) indicates the areas with a risk of termite infestation with a note indicating that local conditions *"may be more or less severe than indicated."* Therefore, the AHJ should use the Figure as a guide, and if the map and the local history are in conflict, then fill the table based on well documented local conditions. An entry of "YES" triggers applicants and designers to meet other provisions, including but not limited to Section R318 of the 2020 RCNYS.

Winter Design Temperature

According to Table 301.2(1) footnote "e," the "winter design temp" may be derived from either:

- *"the columns of 97½-percent values for winter from Appendix D of the* [2020] *Plumbing Code of New York State*…[, or]
- *local climates or local weather experience as determined by the building official*…[, or]
- *Figure R301.2(1)."*

Ice Barrier Underlayment Required

The AHJ shall fill this column with "YES" where there is *"a history of local damage from the effects of ice damming,"* [see Table 301.2(1), footnote "h"] to indicate whether "ice barrier underlayment [is] required" per Section R905.1.2 of the 2020 RCNYS.

Flood Hazards
Table 301.2(1) footnote "g" provides, in part, that *"each community regulated under Title 19, Part 1203 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR) shall adopt a flood hazard map and supporting data."* The flood hazard column shall include a reference to the adopted "flood hazard" map. Footnote "g" also provides that the flood hazard map shall include "*special flood hazard areas as identified by the Federal Emergency Management Agency in the Flood Insurance Study for the community as amended or revised with*" the accompanying Flood Insurance Rate Map (FIRM), a Flood Boundary and Floodway Map (FBFM) and *"related supporting data."* The NYS Department of Environmental Conservation website contains information about the FIRM and FBFM.[4]

Air Freezing Index
Table 301.2(1) footnote "i" references the use of Figure R403.3(2) or the values obtained from the 100-year (99%) column, in the table titled *"Air Freezing Index-USA Method (Base 32°F)"* [5] which provides a station name for various areas around NYS and other states. An AHJ using this table should select the station closest and most analogous with their jurisdiction.

Mean Annual Temperature
The values for "mean annual temp" can be obtained from the column titled *"Mean Annual Temp. (°F)"* in the "Air Freezing Index-USA Method (Base 32°F)" table[5] [see Table 301.2(1) footnote "j"]. This is the same table referenced as an alternative to determine the Air Freezing Index above and an AHJ using this table should select the nearest station closest and most analogous with their jurisdiction.

Manual J Design Criteria
According to footnote "n" to Table R301.2(1) of the 2020 RCNYS, the "*jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction*." The Air Conditioning Contractors of America (ACCA), which is the national trade association for professionals that install and maintain heating, ventilation, air conditioning, and refrigeration, publishes "Manual J: Residential Load Calculations" (Manual J).[6] Manual J is the ANSI recognized standard for determining HVAC equipment loads. Part of the data required to produce HVAC equipment loads is outdoor climate data and this is provided in Table 1a of Manual J. Table 1b does not contain locations in NYS and is therefore excluded from this discussion. By providing the data in Table R301.2(1), an AHJ is providing the necessary localized data to the applicants and designers to provide for consistent design and application of the Uniform Code within their jurisdiction.

The use of Manual J or other approved heating and cooling calculation methodologies is mandatory according Section R403.7 of the 2020 Energy Conservation Construction Code of New York State (2020 ECCNYS). Additionally, Section M1401.3 of the 2020 RCNYS references the use of Manual J for equipment and appliance sizing. Detailed information is provided below for each entry in Table R301.2(1) pertaining to Manual J. As noted in footnote "n," where the AHJ has established another design criteria, those values may be entered in the table.

Elevation

The "elevation" of the location geographically closest and most analogous to the municipality may be chosen out of the locations listed in Manual J Table 1A and by consulting the column labeled "Elevation Feet." Alternatively, entering an elevation range specific to the jurisdiction may be more appropriate.

Latitude

Identify the location geographically closest to your municipality of the locations listed in Manual J Table 1A and consult the column labeled "Latitude Degrees North."

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[4] See https://www.dec.ny.gov/lands/24267.html

[5] Data Center (NOAA) and is available on the NOAA.gov website at https://www.ncdc.noaa.gov/sites/default/files/attachments/Air-Freezing-Index-Return-Periods-and-Associated-Probabilities.pdf.

[6] Manual J—2011: Residential Load Calculation—Eighth Edition is the edition currently incorporated by reference into the 2020 RCNYS and the 2020 ECCCNYS.

Winter Heating

This value represents the temperature for which the ambient dry bulb temperature exceeds 99% of the total hours in a year. Another way of describing it is this is the temperature for which the ambient dry bulb temperature is below 1% of the total hours in a year. Identify the location geographically closest and most analogous to your municipality of the locations listed in Manual J Table 1A and consult the column labeled "Heating 99% Outdoor Dry Bulb."

Summer Cooling

This value represents the temperature for which the ambient dry bulb temperature is below it for 99% of the total hours in a year. Another way of describing it is this is the temperature for which the ambient dry bulb temperature exceeds it for 1% of the total hours in a year. Identify the location geographically closest and most analogous to your municipality of the locations listed in Manual J Table 1A and consult the column labeled "Cooling / Outdoor Air / 1% Dry Bulb."

Altitude Correction Factor

Using the previously obtained "elevation" value as the altitude, consult Manual J Table 10A for the "altitude correction factor" (ACF) for Air Density nearest your altitude. The values are provided at increments of 1,000 feet above sea level. A value may be obtained by either linear interpolation between the two altitudes that most closely resemble the jurisdiction's altitude or by selecting the larger of the two ACF values. A range of values may be necessary where multiple altitudes are found within a jurisdiction.

Indoor Design Temperature

This is a fixed representative indoor temperature used to compute the heating temperature difference. A heating indoor dry bulb temperature of 70°F is used and is specified in Manual J Section A5-3.

Design Temperature Cooling

This is a fixed representative indoor temperature used to compute the heating temperature difference. A cooling indoor dry bulb temperature of 75°F is obtained from Manual J Section A5-3.

Heating Temperature Difference

This is computed by using the following formula:

Heating Temperature Difference = Indoor Design Temperature – Winter Heating

Substituting the values from Table 1A yields:

Heating Temperature Difference = 70°F - Heating 99% Outdoor Dry Bulb

Cooling Temperature Difference

This is computed with the following formula:

Cooling Temperature Difference = Indoor Design Temperature – Summer Cooling

Substituting the values from Table 1A yields:

Cooling Temperature Difference = 75°F- Cooling / Outdoor Air / 1% Dry Bulb

Wind Velocity Heating and Cooling

Wind velocity is used to compute infiltration in cubic feet per minute (ICFM). According to Manual J Section 21-4, the default values are 15 MPH for heating and 7.5 MPH for cooling and should be used except when the location "*has a reputation for wind velocities that consistently exceed these defaults during non-storm conditions, an appropriate set of velocity values may be substituted for the default values*."

Coincident Wet Bulb

Identify the location geographically closest and most analogous with your municipality of the locations listed in Manual J Table 1A in the column labeled "Coincident Wet Bulb" found under the "Summer" column.

Daily Range

Identify the location geographically closest and most analogous with your municipality of the locations listed in Manual J Table 1A in the column labeled “Daily Range (DR)” found under the “Cooling” column.

Winter and Summer Humidity

Average relative winter and summer humidity by month is available for locations throughout NYS on the National Oceanic and Atmospheric Administration (NOAA) website.[7]

In summary, according to Section R301.2 of the 2020 RCNYS “*buildings shall be constructed in accordance with the provisions of this code as limited by the provisions of this section. Additional criteria shall be established by the local jurisdiction and set forth in Table R301.2(1).”* Table R301.2(1) has two distinct portions, the top portion contains climatic and geographic data that is used to determine design features, construction details, and to perform structural calculations. The lower portion is dedicated to inputs necessary for calculating design loads for sizing of heating and cooling equipment in accordance with Manual J.

This document is not intended as a comprehensive listing of all the criteria and information an AHJ should provide to project applicants, nor is it intended to cover all the criteria that must be used by project applicants in the design of buildings governed by the 2020 RCNYS. Other provisions of the Uniform Code apply.

[7] See https://www1.ncdc.noaa.gov/pub/data/ccd-data/relhum18.dat

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD[o]	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP[e]	ICE BARRIER UNDERLAYMENT REQUIRED[h]	FLOOD HAZARDS[g]	AIR FREEZING INDEX[i]	MEAN ANNUAL TEMP[j]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Windborne debris zone[m]		Weathering[a]	Frost line depth[b]	Termite[c]					
—	—	—	—	—	—	—	—	—	—	—	—	—	—

MANUAL J DESIGN CRITERIA[n]							
Elevation	Latitude	Winter heating	Summer cooling	Altitude correction factor	Indoor design temperature	Design temperature cooling	Heating temperature difference
—	—	—	—	—	—	—	—
Cooling temperature difference	Wind velocity heating	Wind velocity cooling	Coincident wet bulb	Daily range	Winter humidity	Summer humidity	—
—	—	—	—	—	—	—	—

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

a. Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The weathering column shall be filled in with the weathering index, "negligible," "moderate" or "severe" for concrete as determined from Figure R301.2(4). The grade of masonry units shall be determined from ASTM C34, C55, C62, C73, C90, C129, C145, C216 or C652.

b. Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.

c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.

d. The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(5)A]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

e. The outdoor design dry-bulb temperature shall be selected from the columns of $97^{1}/_{2}$-percent values for winter from Appendix D of the *Plumbing Code of New York State*. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official. [Also see Figure R301.2(1).]

f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.

g. [NY] To establish flood hazard areas, each community regulated under Title 19, Part 1203 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR) shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, special flood hazard areas as identified by the Federal Emergency Management Agency in the Flood Insurance Study for the community, as amended or revised with:

   i. The accompanying Flood Insurance Rate Map (FIRM),

   ii. Flood Boundary and Floodway Map (FBFM), and

   iii. Related supporting data along with any revisions thereto.

   The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

h. In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall fill in this part of the table with "NO."

i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."

j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."

k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with "YES." Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

l. In accordance with Figure R301.2(5)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

m. In accordance with Section R301.2.1.2 the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

n. The jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction.

o. [NY] The ground snow loads to be used in determining the design snow loads for roofs are given in Figure R301.2(6) for sites at elevations up to 1,000 feet. Sites at elevations above 1,000 feet shall have their ground snow load increased from the mapped value by 2 psf for every 1,000 feet above 1,000 feet.