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Table 1.2 (Cont'd)
Design Data for Selected Locations in Ontario

Location	Elevation, m	Design Temperature				Degree Days Below 18°C	15 Min Rainfall, mm	One Day Rainfall, 1/50, mm	Annual Rainfall, mm	Annual Total Precipitation, mm	Driving Rain Wind Pressures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data				
		January		July 2.5%																
		2.5%, °C	1%, °C	Dry, °C	Wet, °C							S_s	S_r	1/10	1/50	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	PGA
Smooth Rock Falls	235	-34	-36	29	21	6250	20	92	560	850	80	2.7	0.3	0.25	0.32	0.160	0.089	0.049	0.017	0.085
South River	355	-27	-29	29	22	5090	25	103	830	975	120	2.8	0.4	0.27	0.35	0.230	0.140	0.077	0.027	0.086
Southampton	180	-17	-19	28	22	4100	25	92	800	830	180	2.7	0.4	0.41	0.53	0.110	0.078	0.051	0.017	0.036
St. Catharines	105	-16	-18	30	23	3540	23	92	770	850	160	1.0	0.4	0.36	0.46	0.340	0.190	0.069	0.023	0.200
St. Mary's	310	-18	-20	30	23	4000	28	108	820	1025	160	2.2	0.4	0.36	0.47	0.140	0.086	0.054	0.017	0.049
St. Thomas	225	-16	-18	31	24	3780	25	103	900	975	180	1.4	0.4	0.36	0.47	0.160	0.096	0.056	0.017	0.088
Stirling	120	-23	-25	30	23	4220	25	97	740	850	120	1.7	0.4	0.31	0.40	0.250	0.160	0.088	0.028	0.096
Stratford	360	-18	-20	29	23	4050	28	113	820	1050	160	2.3	0.4	0.35	0.45	0.140	0.087	0.055	0.018	0.045
Strathroy	225	-17	-19	31	24	3780	25	103	770	950	180	1.9	0.4	0.36	0.47	0.140	0.086	0.052	0.016	0.064
Sturgeon Falls	205	-28	-30	29	21	5200	25	95	700	910	140	2.2	0.4	0.27	0.35	0.220	0.130	0.072	0.025	0.086
Sudbury	275	-28	-30	29	21	5180	25	97	650	875	200	2.5	0.4	0.36	0.46	0.150	0.100	0.059	0.020	0.051
Sundridge	340	-27	-29	29	22	5080	25	97	840	975	120	2.8	0.4	0.27	0.35	0.230	0.140	0.076	0.026	0.082
Tavistock	340	-19	-21	29	23	4100	28	113	820	1010	160	2.1	0.4	0.35	0.45	0.140	0.090	0.056	0.018	0.053
Temagami	300	-30	-33	30	22	5420	23	92	650	875	120	2.6	0.4	0.29	0.37	0.250	0.150	0.077	0.026	0.120
Thamesford	280	-19	-21	30	23	3950	28	108	820	975	160	1.9	0.4	0.37	0.48	0.160	0.095	0.056	0.018	0.076
Thedford	205	-16	-18	31	23	3710	25	103	810	900	180	2.1	0.4	0.39	0.50	0.120	0.077	0.050	0.016	0.038
Thunder Bay	210	-31	-33	29	21	5650	23	108	560	710	160	2.9	0.4	0.30	0.39	0.095	0.057	0.026	0.008	0.036
Tillsonburg	215	-17	-19	30	24	3840	25	103	880	980	160	1.3	0.4	0.34	0.44	0.170	0.100	0.058	0.018	0.091
Timmins	300	-34	-36	29	21	5940	20	108	560	875	100	3.1	0.3	0.27	0.35	0.140	0.090	0.054	0.018	0.056
Timmins (Porcupine)	295	-34	-36	29	21	6000	20	103	560	875	100	2.9	0.3	0.29	0.37	0.160	0.094	0.056	0.018	0.068
Toronto (Metropolitan)																				
Etobicoke	160	-20	-22	31	24	3800	26	108	720	800	160	1.1	0.4	0.34	0.44	0.210	0.120	0.065	0.021	0.110
North York	175	-20	-22	31	24	3760	25	108	730	850	150	1.2	0.4	0.34	0.44	0.190	0.110	0.066	0.021	0.078
Scarborough	180	-20	-22	31	24	3800	25	92	730	825	160	1.2	0.4	0.36	0.47	0.190	0.110	0.068	0.022	0.076
Toronto (City Hall)	90	-18	-20	31	23	3520	25	97	720	820	160	0.9	0.4	0.34	0.44	0.220	0.130	0.067	0.021	0.120
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

As a result of the updating procedure, the 1-in-50 reference wind velocity pressures remain unchanged for most of the locations listed in Table 1.2; both increases and decreases were noted for the remaining locations. Many of the decreases resulted from the fact that anemometers at most of the stations used in the previous analysis were installed on lighthouses, airport hangers and other structures. Wind speeds on the tops of buildings are often much higher compared to those registered by a standard 10 m tower. Eliminating anemometer data recorded on the tops of buildings from the analysis resulted in lower values at several locations.

Hourly wind speeds that have 1 chance in 10 and 50[1] of being exceeded in any one year were analyzed using the Gumbel extreme value distribution fitted using the method of moments with correction for sample size. Values of the 1-in-30-year wind speeds for locations in Table 1.2 were estimated from a mapping analysis of wind speeds. The 1-in-10- and 1-in-50-year speeds were then computed from the 1-in-30-year speeds using a map of the dispersion parameter that occurs in the Gumbel analysis.(1)

Table 1.1 has been arranged to give pressures to the nearest one-hundredth of a kPa and their corresponding wind speeds. The value of "q" in kPa is assumed to be equal to 0.00064645 V^2, where V is given in m/s.

Seismic Hazard

The parameters used to represent seismic hazard for specific geographical locations are the 5%-damped horizontal spectral acceleration values for 0.2, 0.5, 1.0, and 2.0 second periods and the horizontal Peak Ground Acceleration (PGA) value that have a 2% probability of being exceeded in 50 years. The four spectral parameters are deemed sufficient to define spectra closely matching the shape of the Uniform Hazard Spectra (UHS). Hazard values are 50th percentile (median) values based on a statistical analysis of the earthquakes that have been experienced in Canada and adjacent regions.(13)(14)(15)(16) The median was chosen over the mean because the mean is affected by the amount of epistemic uncertainty incorporated into the analysis. It is the view of the Geological Survey of Canada and the members of the Standing Committee on Earthquake Design that the estimation of the epistemic uncertainty is still too incomplete to adopt into the Code.

The seismic hazard values were updated for the 2012 edition of the Building Code by replacing the quadratic fit that generated the 2006 Building Code values with a newly developed 8-parameter fit to the ground motion relations used for earthquakes in eastern, central and north-eastern Canada. In 2006, it was recognized that, while the quadratic fit provided a good approximation in the high-hazard zones, it was rather conservative at short periods, but not at long periods, for the low-hazard zones; however, as the design values are small in the low-hazard zones, the approximation was accepted. The 8-parameter fit gives a good fit across all zones. In general, PGA and short-period spectral values are reduced, while long-period values are increased. The 2012 values have the following engineering implications: geotechnical design levels (based on PGA values) are reduced, the design forces for short-period buildings are reduced, and the design forces for tall buildings are increased. Since zones of low seismicity cover a large part of the country, the seismic information for many of the localities listed in Table 1.2 has changed (often in a minor way).

Further details regarding the representation of seismic hazard can be found in the Commentary on Design for Seismic Effects in the User's Guide - NBC 2010, Structural Commentaries (Part 4 of Division B).

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[1] Wind speeds that have a one-in-"n"-year chance of being exceeded in any year can be computed from the one-in-10 and one-in-50 return values in Table 1.2 using the following equation:

$$V_{1/n} = \frac{1}{1.4565}\left\{V_{1/50} + 0.4565\,V_{1/10} + \frac{V_{1/50} - V_{1/10}}{1.1339} \times \ln\frac{-0.0339}{\ln(1-1/n)}\right\}$$