

The Boundary Layer Wind Tunnel Laboratory

**AN EXPLORATORY STUDY OF THE
CLIMATIC RELATIONSHIPS
BETWEEN RAIN AND WIND**

By:

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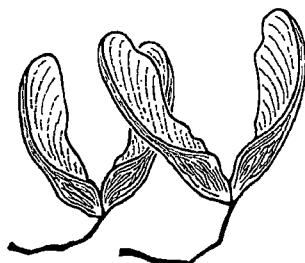
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NOTE: LE RÉSUMÉ EN FRANÇAIS SUIT IMMÉDIATEMENT LE RÉSUMÉ EN ANGLAIS.

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This publication is one of the many items of information published by CMHC with the assistance of federal funds.

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ÉTUDE EXPLORATOIRE DES RELATIONS CLIMATIQUES EXISTANT ENTRE LA PLUIE ET LE VENT

RÉSUMÉ

Une étude exploratoire a été menée à la soufflerie aérodynamique de l'université Western Ontario en vue de déterminer les relations climatiques qui existent entre la pluie et le vent.

C'est la Société canadienne d'hypothèques et de logement qui a commandé l'étude en raison de son intérêt pour le vent, la pluie et l'enveloppe des bâtiments. La portée de l'étude a été établie par Jacques Rousseau, de la SCHL, et Alan Davenport et David Surry, du laboratoire de la soufflerie. Le premier objectif visé était l'examen de la relation entre le vent et le taux de précipitations de pluie. Le second était l'applicabilité de la pression de la pluie poussée par le vent (PPPV), une mesure créée par Welsh, Skinner et Morris (1989), aux problèmes d'enveloppe du bâtiment.

La base de données utilisée pour cette étude exploratoire est constituée de mesures d'une minute des vitesses et des directions du vent moyennes enregistrées chaque heure pendant 10 ans (de 1980 à 1989) par cinq stations disséminées un peu partout au Canada. Seuls les mois d'avril à septembre ont été étudiés dans le but d'obtenir les données de précipitations de pluie recueillies par des pluviomètres automatiques. Ces données ont été réparties en sept catégories d'intensité de précipitations. Les statistiques relatives à la vitesse du vent (histogrammes, moyennes, écarts types, valeurs extrêmes sur 10 ans) ont été calculées pour chaque catégorie, et des roses des vents ont été construites selon les directions du vent enregistrées à toutes les heures et aux heures de précipitations seulement.

On a découvert que la direction préférée des vents forts accompagnant la pluie diffère considérablement de celle qui est associée aux conditions climatiques générales. Cette information pourrait s'avérer fort utile aux concepteurs d'enveloppe avertis.

Ces résultats indiquent aussi que la vitesse moyenne des vents est toujours plus élevée en période de précipitations qu'en temps normal (dans certains cas, toutes les vitesses moyennes sans exception augmentent à mesure qu'augmente le taux de précipitations). Cela dit, les vitesses extrêmes du vent pendant les dix années de référence se sont avérées régulièrement inférieures, durant les périodes de précipitations, comparativement au temps normal. Une large part de la réduction de ces vitesses extrêmes en période de précipitations peut être attribuée aux occasions limitées qu'ont eues les vents d'atteindre des valeurs extrêmes, du fait, par exemple, que les périodes de précipitations ne représentent qu'un faible pourcentage du temps total.

La base de données utilisée, de portée limitée, indique qu'il pourrait être justifié de donner une définition plus simple à la PPPV, à savoir qu'elle ne constituerait qu'une fraction de la pression susceptible d'être atteinte en 10 ans, selon le Code national du bâtiment du Canada, étant donné les nombreuses autres incertitudes inhérentes à la conception des enveloppes du bâtiment pour tenir compte des infiltrations de pluie.

On suggère des façons d'améliorer la base de données et les méthodes d'analyse de manière à mieux décrire les conditions de vent en période de pluie. Cette étude doit être poursuivie, mais avec une base de données plus large que pour cette étude exploratoire.

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EXECUTIVE SUMMARY

An exploratory study has been conducted at the Boundary Layer Wind Tunnel Laboratory of the University of Western Ontario to investigate the climatic relationships between rain and wind.

Canada Mortgage and Housing Corporation, through their interest in wind, rain and the building envelope, initiated this project. The scope of the study was an outcome of discussions with Jacques Rousseau of CMHC and Alan Davenport and David Surry of the BLWTL. The primary objective was to examine the relationship between wind and rainfall rate. A secondary objective was to explore the applicability of the existing Driving Rain Wind Pressures (DRWP), derived by Welsh, Skinner and Morris (1989), to the problems of the building envelope.

The data base used in this exploratory study consisted of 10-year records (1980-1989) of 1-minute average wind speeds and directions recorded every hour along with the corresponding hourly rainfall for five stations across Canada. Only the months of April to September were examined to ensure the availability of the rainfall data from automatic rain gauges. These data were sorted into seven categories reflecting different rainfall intensities. The wind speed statistics (i.e. histograms, averages, standard deviations and 10-year extremes) were calculated for each category and wind roses were constructed using the wind directions for all hours and for wet hours only.

It was found that the preferred directions of strong winds accompanying rain are significantly different than those associated with all conditions. This may provide useful information to sophisticated designers of building envelope systems.

Results also indicate that mean wind speeds are consistently higher during rainy hours than during all hours (in some cases the mean speeds increase consistently with rainfall rate); however, 10-year extreme wind speeds were found to be consistently smaller for wet hours than for all hours. Much of this reduction of extreme speeds for wet hours is attributed to the reduced number of opportunities for the extremes to occur - i.e. rainy hours only make up a small percentage of the total time.

The limited data base examined indicates that a simpler definition of the DRWP as simply a fraction of the National Building Code of Canada's ten year pressure may be justified, considering numerous other uncertainties involved in designing building envelopes for water penetration.

Suggestions are made for improving the data base and the analysis methods to best describe wind conditions during rain. This work should be continued using a much broader data base than was possible to use in this exploratory study.

1.0 DRIVING RAIN WIND PRESSURES

The wind pressures appropriate for use in evaluating water tightness of windows have been termed Driving Rain Wind Pressures (DRWP), and have been evaluated by Welsh, Skinner and Morris (1989) for use in the Canadian Standards Association CAN/CSA-A440-M90. Using available data between 1953 and 1985, Welsh et al analysed the annual extreme wind speeds occurring during rainfalls exceeding chosen threshold rainfall rates. These were determined for 188 Canadian sites based on 6-hourly precipitation records, one or two-minute wind speeds recorded every hour, and hourly notes regarding the precipitation types and intensities. Hourly rainfall rates were estimated from both the six-hourly data and the hourly notes (see more details below), and the annual maximum wind speeds were then determined for those hours that exceeded thresholds of 1.8 mm, 3.0 mm and 5.1 mm of rain. Each of the three sets of annual maxima were analysed and the results were all presented in Welsh et al (1989), however, the DRWP for the CSA Standard were taken to be the pressures associated with hourly rainfalls exceeding 1.8 mm.

Welsh et al (1989) have taken considerable care to outline the assumptions that they have made in deriving the DRWP, both in the analysis of the available data, and in their interpretation for use in the Standard where they are related to a standard window test. This test currently calls for a constant pressure applied for four consecutive 5 minute periods, separated by 1-minute intervals of zero pressure, while continuously being sprayed with water at a relatively high rate.

Following is a review of the primary uncertainties in the current DRWP together with suggestions of possible improvements.

- 1) The data base used by Welsh et al required that the hourly rainfall data be estimated from a 6-hourly quantitative precipitation amount and a qualitative hourly precipitation indicator (i.e. light, ≤ 2.5 mm/hr; moderate, 2.6 to 7.5 mm/hr; and heavy ≥ 7.6 mm/hr). Although the estimation method is reasonable, given the available information, it is only very approximate.
- 2) All of the wind data are one or two-minute observations on the hour. For any particular hour, these data could misrepresent the average wind speed of that hour by varying degrees up to as much as $\pm 25\%$. This may introduce considerable variability into the resulting extreme-value analysis of the annual extremes.
- 3) Little guidance is given in either the Standard or Welsh et al as to whether there is any significant expected change of wind pressure with rainfall rate (although the report by Welsh et al does include the results of the analysis for three different threshold rain intensities in an Appendix).

It is difficult to do very much about the deficiencies of the climatic data base. The 6-hourly precipitation readings are the only ones that are available year-round. There are alternative hourly rainfall readings that are available for most stations during the warm season, which have been used in the analysis reported below. Using the hourly measurements of rainfall when they are available and the estimations otherwise would likely improve the accuracy of the results.

There are alternatives to the use of annual extreme short-duration wind speeds. Extreme values can also be predicted from a knowledge of the underlying parent distribution of wind speeds. This may be a better approach, particularly for the short return-period events of interest here. This would involve re-examining the data base and collecting all of the 1-minute wind speeds associated with the rainfall rates of interest at a given site (for example, those for which greater than 1.8 mm of rain fell, to parallel the current DRWP). The resulting statistical distribution is a good estimator of the true underlying probability distribution because there are so many hourly readings involved that the high ones tend to average with the low ones for a particular underlying mean speed. In contrast, the small collection of annual extremes (perhaps 30 values) are less likely to be truly representative. Once the parent distribution is defined, estimates of the extremes can be extracted. This is explored further below. This method also allows the directional aspects of the parent wind speed distribution associated with rain to be found. This directionality may have direct design interest.

If analysis problems are temporarily put aside, it should be emphasized that the current values of DRWP are estimates of annual extreme mean hourly wind speeds associated with what is considered sufficient rain to provide the quantity of water on the building surface from which leaks may occur.

In this context, it is worth reviewing the relevant parameters affecting the interaction of wind, rain and the building envelope. For a given wind and rain condition (a specific value of DRWP), both the actual pressure and the amount of rain impacting on a section of the building envelope will depend on a variety of parameters, of which the most important are:

- 1) how close the area is to the edges of the building, and its height above ground.
- 2) the geometry of the building and the nearby surroundings.
- 3) the direction of the wind relative to the area considered.
- 4) time. Both the wind and rainfall rate are "gusty"; their peak values significantly exceed their mean values over an hour.

The above issues all merit consideration; for example, other parts of this project (Surry et al (1994)) are attempting to address the building aerodynamics issue. However, in the derivation of the DRWP, apart from addressing the uncertainties in the analysis itself, it would be beneficial to consider issues 3 and 4 mentioned above for its application to the general leakage problems of building envelopes. This is discussed further below.

A conservative approach to building envelope design would be to assume that the DRWP could act in any direction and therefore the envelope on all sides of a building would be designed equal. However, deriving DRWP values for a full range of directional sectors may lead to more economical designs of favourably oriented facades.

While the significant variations of rainfall rate within a storm (and more generally) may not be of importance so long as some minimum threshold amount is passed (taken as 1.8 mm/hr in the DRWP), it is more difficult to believe that the significant variations of wind pressure due to gustiness within the storm are not important. For structural design of local panels, a gust factor of 2.5 on the mean pressure is recommended. The appropriate gust factor for use in determining whether a panel will leak or not is worthy of further consideration.

2.0 SCOPE OF CURRENT WORK

The objectives of the current analysis were exploratory, and were focused primarily on two issues:

- 1) to examine whether there is a significant relationship between wind speed and rainfall rate.
- 2) to determine whether the wind directions associated with wet hours are significantly different from the directionality of all winds.

The data base used were 10-year records for five stations, chosen primarily to be representative of different climates within Canada. They were

- 1) Victoria, B.C.
- 2) Regina, Sask.
- 3) London, Ontario
- 4) Ottawa, Ontario
- 5) St. John's, Nfld.

In all cases, wind speeds were available at 10 m and in open surroundings, therefore, no corrections have been made to the basic wind data. Only the months

of April to September were examined so that hourly readings from automatic rain gauges could be used, and hence the estimation of hourly rainfall rates could be avoided in this work; however, this was only acceptable here because trends are of interest, rather than absolute values for use in a standard. The authors support the approximations previously made regarding rainfall rates by Welsh et al, with the provision that it would be worthwhile to verify those estimates by direct comparison with the hourly rates where both are available.

For all five stations, the records of wind speed and direction were sorted into seven categories according to hourly rainfall amounts as follows:

- 1) 0 mm
- 2) > 0 to 1 mm
- 3) > 1 to 2 mm
- 4) > 2 to 3 mm
- 5) > 3 to 4 mm
- 6) > 4 to 5 mm
- 7) > 5 mm

Histograms of the complete data set ("all data", categories 1 through 7) are compared with those for all of the wet hours combined ("all rain", categories 2 through 7) in Figures 1a to 1e. The overall average and standard deviation of wind speed together with the number of observations are provided with each histogram (denoted as avg, rms and N respectively). Note that the percentage of wet hours is small in all cases, varying from 4.3% in Regina to 10.2% in St. John's. The detailed breakdown of histograms into the six rain intensity classes is shown in Figures 2a to 2e. Figure 3 provides insight into the distribution of rainfall hours with rainfall rate. Figure 3a shows the number of hours for which each rainfall rate was observed, and Figure 3b shows Weibull fits to the normalized cumulative distribution of hourly rainfall rates. The correlation indicating goodness of fit exceeds 0.99 for all cases. Finally, the comparisons of the directionality of the wet hours with that of the total set of hours (the normal wind rose) is shown in Figures 4a to 4e.

In this report, data are primarily presented for all hours and for wet hours. The wind roses for only the dry hours were also developed but are virtually indistinguishable from the all hours results because the wet hours constitute such a small percentage of the total. The virtue of the all hours data is that they correspond to the form in widespread use.

3.0 DISCUSSION

Figure 4 illustrates a significant trend of rain to be associated with different directions than indicated by the normal wind rose. As mentioned above, this could provide useful information to sophisticated design approaches. Clearly, some building surfaces will receive less wind-driven rain than others, depending on their orientation.

Figure 5 shows the mean speed and standard deviations for the data plotted versus rainfall rate. It is clear that there is a trend for the mean wind speed to be greater when it is raining and, for some stations, the mean speed increases fairly steadily with rainfall rate. The comparable statistics for the entire data set are also shown. Note that the difference between the mean speeds for all hours and for just the dry hours is under 2% in all cases.

Predictions of annual extreme speeds were made in two ways. First, the annual maximum 1-minute speeds were fitted directly to a Type I distribution. Second, the parent data were fitted to a Weibull distribution [$P(>V) = e^{-(V/C)^k}$] and the Weibull parameters in turn were used to estimate the mode and dispersion of a Type I distribution for the annual extremes. This also requires an assumption to be made as to how many of the observations were independent events - i.e. the crossing rate. For simplicity, and because the number of wet hours are fairly few, all observations were considered independent. This assumption needs further review.

The results are tabulated in Tables 1a to 1e. The highlighting indicates results that are most closely comparable between the current analysis and that of Welsh et al. Despite the trend in the mean speed, the predictions of annual extreme speeds are significantly lower when there is rain than when all the data are considered. Although the current results were derived from only 10 years of data, they are consistent with similar results extracted from Appendix B of Welsh et al where DRWP values were provided for three threshold rainfall values. They have been converted here to wind speeds. The National Building Code value of the 10-year speed (all hours) is also included for reference. Although the trends in the extremes are similar, as expected, the Welsh et al predicted speeds are higher primarily because they include the entire year.

These trends are also consistent with other publications that have examined extreme wind speeds during rainfall, for example Murakami et al (1987) for stations in Japan and Choi (1992) for Sydney, Australia. In both of these cases, the rainfall rate thresholds considered were nearly ten times greater.

Further insight into the trends in these data can be obtained from Table 2 which provides a number of ratios for the five sites. The ratio of the 10-year extremes as predicted using just the wet hours to those using all hours, shown in the first two

columns, clearly indicate the wet hours to have lower 10-year speeds. The parent method seems to predict a ratio that is higher on average than that derived using the annual extremes directly. The 10-year speeds for the six rain intensity classes were normalized by the "all data" extreme and are plotted in Figure 6. The results again show reduced extreme wind speeds when it is raining and that the reduction generally increases with rainfall rate. This plot further indicates that the use of annual maxima directly lead to larger reductions in contrast to the parent distribution approach. This may be a result of the assumption made regarding the independence of hourly wind speeds for the parent approach. If the crossing rate appropriate for wind speed observations during rain is lower than that suitable for all winds, which is possible since rain is often associated with a well developed low pressure system that generates enduring wind conditions, then the "parent" ratios shown in Figure 6 would be somewhat lower. It can also be seen in Figure 6 that, for a given location, the ratios predicted using the 10 annual maximum wind speeds exhibit more variability than those derived using the parent distribution. This reflects the idea that the use of a much larger number of observations, as in the "parent" approach, reduces the variability present in the observations themselves, leading to a distribution that better describes the data.

The use of relatively short and restricted data bases (10 summers) in this report clearly leads to absolute values of the predicted wind speeds that are lower than roughly comparable values from Welsh et al. This is illustrated in the third column of Table 2 by the ratio of the "all rain" wind speeds obtained here to the > 1.8 mm results from Welsh et al. This ratio is generally less than 1.0, reflecting primarily the partial year in the current case (particularly for the mild climate of Victoria), and partially the different thresholds used to define wet hours.

Much of this trend of decreasing extreme speed with increasing rainfall rate is attributable simply to the decreasing number of observations of the higher rates - i.e. there are fewer opportunities for an extreme to occur. This can be illustrated using the relationship between the parent Weibull distribution and its extreme value distribution which leads to

$$\frac{\hat{V}(R)}{C} = (\ln N)^{1/k} + \frac{(\ln N)^{1/k-1}}{k} \ln R \quad (1)$$

where $\hat{V}(R)$ is the expected annual extreme speed for a particular return period, R ; C and k are the Weibull parameters; and N is the average number of independent observations per year (or per summer in the case of this study).

If we assume that the underlying parent wind distribution is actually independent of rainfall rate, and is Raleigh with $k = 2$ (in fact k was found to range from 1.5 to 2.0), then the ratio of 10-year wind speed for two different rainfall rates, i and j , is simply

$$\frac{\hat{V}_i(10)}{\hat{V}_j(10)} = \frac{\sqrt{\ln N_i} + (\ln 10)/(2\sqrt{\ln N_i})}{\sqrt{\ln N_j} + (\ln 10)/(2\sqrt{\ln N_j})} \quad (2)$$

For simplicity, N has been taken as the actual number of observations for these sparse rain events. For the frequent N values, they should be reduced by an effective crossing rate; however, because of the logarithmic nature of the relationship, this does not introduce significant errors.

Under the above assumptions, this relationship typically predicts that the extreme speed for the > 4 to 5 mm rain level should be only about 70% of that for all data, which is reasonably consistent with the reductions seen in Figure 6. To take this one step further, the value of the "all data" Weibull exponent, k , determined in the present analysis was used to derive an otherwise similar relationship based on the same assumptions for each site. The predicted ratios for each rainfall category are presented in Figure 6 and show exceptional agreement. The consistent increase shown by all three curves in the extreme speed that occurs from the > 4 to 5 mm rain level to the > 5 mm rain level is simply due to the relatively larger number of observations present in the latter category.

The last column in Table 2 explores the possibility of defining DRWP values as simply a fraction of the NBCC 10-year return period pressures. The success demonstrated above of predicting such a ratio based on the average number of hours per year of a particular rain category supports this possibility. Table 2 shows consistently that the ratios of the DRWP 10-year speed to the NBCC 10-year speed are lower than the ratios of the "all rain" to "all data" 10-year speed from the present study. This is likely due to the fact that winter storms, which generally produce the strongest winds, were not captured in this study, which would primarily influence the "all data" extreme, hence, resulting in a larger ratio. The effect of simply using half a season may otherwise cancel out somewhat in the ratio.

To pursue this further, similar ratios were determined, using the 1/10 DRWP and the 1/10 NBCC pressures for all Canadian stations using Welsh et al's data base. Note that the ratio of the 1/10 speeds as presented is simply the square root of the ratio of the 1/10 pressures. The results are included as Appendix I, and are plotted for Ontario as an example in Figure 7.

As in Table 2, the ratios in Figure 7 are consistently lower than those found in this study and exhibit a great deal of scatter. However, in examining the data presented in Figure 7, the question arises as to how much of this scatter is due to the analysis techniques and interpolation in both the NBCC and the DRWP 1/10 values, and how much is real. A detailed study of Figure 7 suggests many inconsistencies from stations that are geographically very close together, which is physically difficult to rationalize (see for example ~45.5°N lat. and 76.5°W long. where the ratio changes from 0.62 to 0.82 over a very small distance). In some

cases there appears to be a lakeshore effect, but this is again not entirely consistent. Looking at the entire data base in Appendix I, there is even the occasional location for which the DRWP 1/10 pressure exceeds the NBCC 1/10 pressure, which in reality is a physical impossibility, since the wet hours are not excluded when deriving the overall 1/10 wind speeds. In this case, however, the data bases are not exactly the same and hence variability gives rise to the anomaly.

The relationship (2) above can also be used to obtain a rough estimate of the expected reduction in wind speed associated with the DRWP, simply due to the reduced number of wet hours. To do this, N_i was taken as all observations $> 2 \text{ mm}$ (roughly comparable with $> 1.8 \text{ mm}$ used in the DRWP) and N_j was taken as all hours. In the latter case, the true number of hours and 10% of these were both used, to investigate the sensitivity to crossing rate. For all 5 stations, predicted reductions in extreme speeds were in the range 0.73 to 0.91 (half of this range is attributable to the choice of the number of independent hours). These are remarkably similar to the values shown in Figure 7.

It is worth examining further the effect the crossing rate has on the predicted ratios. Consider a location where there are an average of 100 hours per year when the rain intensity exceeds 2 mm and the Weibull exponent, k , for describing the underlying parent wind speeds is 1.7 (roughly the average for this study). First assuming complete independence ($N_i = 100$ and $N_j = 8760$) and then a crossing rate of 70% ($N_i = 70$ and $N_j = 6132$) the resulting ratios differ by about 1.0%. The difference increases to approximately 2.7% when using a crossing rate of 40%. Clearly, the ratio itself is not very sensitive to the crossing rate.

This study advances the idea of defining extreme wind pressures during rainfall as a simple ratio of existing NBCC 1/10 pressures, possibly with some regional variation, and should be continued with a much broader data base.

4.0 CONCLUDING REMARKS

An exploratory investigation into the joint statistics of wind and rain, using a very limited data base over 10 years for five sites has led to the following tentative conclusions and suggestions for further work:

- 1) There are significant differences in the wind roses associated with wet hours only as compared to all hours. It would therefore be worthwhile to derive directional DRWP values for use in sophisticated approaches to design for wind-driven rain, using a more complete data base.

- 2) The mean wind speed during wet hours is consistently higher than the overall mean wind speed; however, the once-in-ten-year extreme speeds are lower for wet hours than for all hours. Much of this reduction of extreme speeds for wet hours seems to be predictable based on the reduced number of opportunities for extremes to occur. This is worthy of further investigation. In particular, it should be established whether the parent wind speeds for the wet hours are statistically the same as those for all hours. The difference in the means suggests that this may not be true; however, if the statistics of wind during rain can be shown to be acceptably similar to the statistics of all winds, then the DRWP values should be predictable from the overall wind speed predictions as given in the NBCC and from the incidence of wet hours such as shown in Figure 3. Preliminary examination of the ratio of the 1/10 DRWP to the 1/10 NBCC pressure supports this possibility. It also suggests that, currently, there are significant inconsistencies in one or both of these statistics, and that a simpler definition of DRWP, perhaps based on a regionally-dependent ratio of the NBCC value, could be just as valid statistically and simpler for general use.
- 3) The use of one or two-minute wind speeds recorded every hour to approximate true hourly averages leads to increased scatter in predicted extremes. For the limited data base considered here, the parent distribution method (in which all hourly observations are used to define the statistics of the parent process, and these are used to predict the extremes) reduces the variability in the estimated extremes compared to the variability in those derived from the annual maxima directly. This suggests that part of the variation of extreme wind speeds with rainfall rate observed by Welsh et al may have been due to the extra variability introduced by using annual observed one or two-minute extremes. For this reason a parent distribution approach may be more suited for predicting extremes when this type of wind data is available. The ability of short-duration wind speeds to approximate the distribution (whether it be the parent or extreme) of hourly averaged wind speeds is an important issue for further study.
- 4) For application to the building envelope problem, the DRWP (or a similar parameter) clearly provides useful guidance; however, several areas of uncertainty require further investigation. In particular, the ratio of local wetting on a building to ambient rainfall rate requires definition, as this can significantly amplify or reduce the DRWP. This is the subject of a separate project (Incullet and Surry (1994)). In addition, the gust factors appropriate for extreme wind pressures during rainfall is an issue worthy of examination when the process of leaks under the action of wind-driven rain are better understood.

- 5) It would be beneficial in the longer term to improve the available wind and rain records by routinely providing hourly precipitation data year-round, even if this were restricted to selected stations. It would also be useful to gather information on the variation of rainfall rates over periods shorter than one hour. Longer averaging times for wind speeds would also be beneficial.

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VICTORIA

Current Study			
rain level	extreme wind speed (km/hr), R = 10 summers		
	observed maxima	Type I from maxima	Type I from parent
> 0 to 1 mm	35	35	37
> 1 to 2 mm	31	31	30
> 2 to 3 mm	31	33	30
> 3 to 4 mm	26	25	27
> 4 to 5 mm	15	15	17
> 5 mm	20	19	30
ALL DATA	54	51	44
ALL RAIN	35	34	37

DRWP		NBCC
rain level	extreme wind speed (km/hr)	extreme wind speed (km/hr)
	R = 10 years	R = 10 years
> 1.8 mm	52	
> 3.0 mm	44	98
> 5.1 mm	37	

Table 1a. Annual extreme wind speeds

REGINA

Current Study			
rain level	extreme wind speed (km/hr), R = 10 summers		
	observed maxima	Type I from maxima	Type I from parent
> 0 to 1 mm	72	70	70
> 1 to 2 mm	61	68	63
> 2 to 3 mm	63	62	57
> 3 to 4 mm	52	56	60
> 4 to 5 mm	44	49	53
> 5 mm	56	57	54
ALL DATA	80	79	75
ALL RAIN	72	70	71

DRWP		NBCC
rain level	extreme wind speed (km/hr)	extreme wind speed (km/hr)
	R = 10 years	R = 10 years
> 1.8 mm	70	
> 3.0 mm	63	83
> 5.1 mm	60	

Table 1b. Annual extreme wind speeds

LONDON

Current Study			
rain level	extreme wind speed (km/hr), R = 10 summers		
	observed maxima	Type I from maxima	Type I from parent
> 0 to 1 mm	56	60	54
> 1 to 2 mm	48	48	45
> 2 to 3 mm	44	46	48
> 3 to 4 mm	46	43	47
> 4 to 5 mm	48	50	49
> 5 mm	46	49	47
ALL DATA	74	71	66
ALL RAIN	56	59	55

DRWP		NBCC
rain level	extreme wind speed (km/hr) R = 10 years	extreme wind speed (km/hr) R = 10 years
> 1.8 mm	66	
> 3.0 mm	60	85
> 5.1 mm	55	

Table 1c. Annual extreme wind speeds

OTTAWA

Current Study			
rain level	extreme wind speed (km/hr), R = 10 summers		
	observed maxima	Type I from maxima	Type I from parent
> 0 to 1 mm	48	45	44
> 1 to 2 mm	43	47	43
> 2 to 3 mm	33	36	41
> 3 to 4 mm	33	36	34
> 4 to 5 mm	35	37	39
> 5 mm	67	63	50
ALL DATA	67	65	60
ALL RAIN	67	62	54

DRWP		NBCC
rain level	extreme wind speed (km/hr) R = 10 years	extreme wind speed (km/hr) R = 10 years
> 1.8 mm	61	
> 3.0 mm	59	78
> 5.1 mm	55	

Table 1d. Annual extreme wind speeds

ST. JOHN'S

Current Study			
rain level	extreme wind speed (km/hr), R = 10 summers		
	observed maxima	Type I from maxima	Type I from parent
> 0 to 1 mm	67	70	71
> 1 to 2 mm	74	73	70
> 2 to 3 mm	67	68	72
> 3 to 4 mm	65	65	59
> 4 to 5 mm	56	59	63
> 5 mm	57	64	69
ALL DATA	74	78	77
ALL RAIN	74	73	75

DRWP		NBCC
rain level	extreme wind speed (km/hr) R = 10 years	extreme wind speed (km/hr) R = 10 years
> 1.8 mm	97	
> 3.0 mm	83	110
> 5.1 mm	79	

Table 1e. Annual extreme wind speeds

location	<u>all rain</u> all data		* <u>all rain</u> DRWP	<u>DRWP</u> NBCC
	from maxima	from parent		
Victoria	0.67	0.84	0.71	0.53
Regina	0.89	0.95	1.01	0.84
London	0.83	0.83	0.83	0.78
Ottawa	0.95	0.90	0.90	0.78
St. John's	0.89	0.97	0.97	0.88

* all rain extreme wind speed calculated from parent population

Table 2. Comparison of 1 in 10 year annual extreme wind speeds from
 a) current study (all rain, all data)
 b) DRWP (> 1.8 mm of rain per hour)
 c) NBCC

VICTORIA

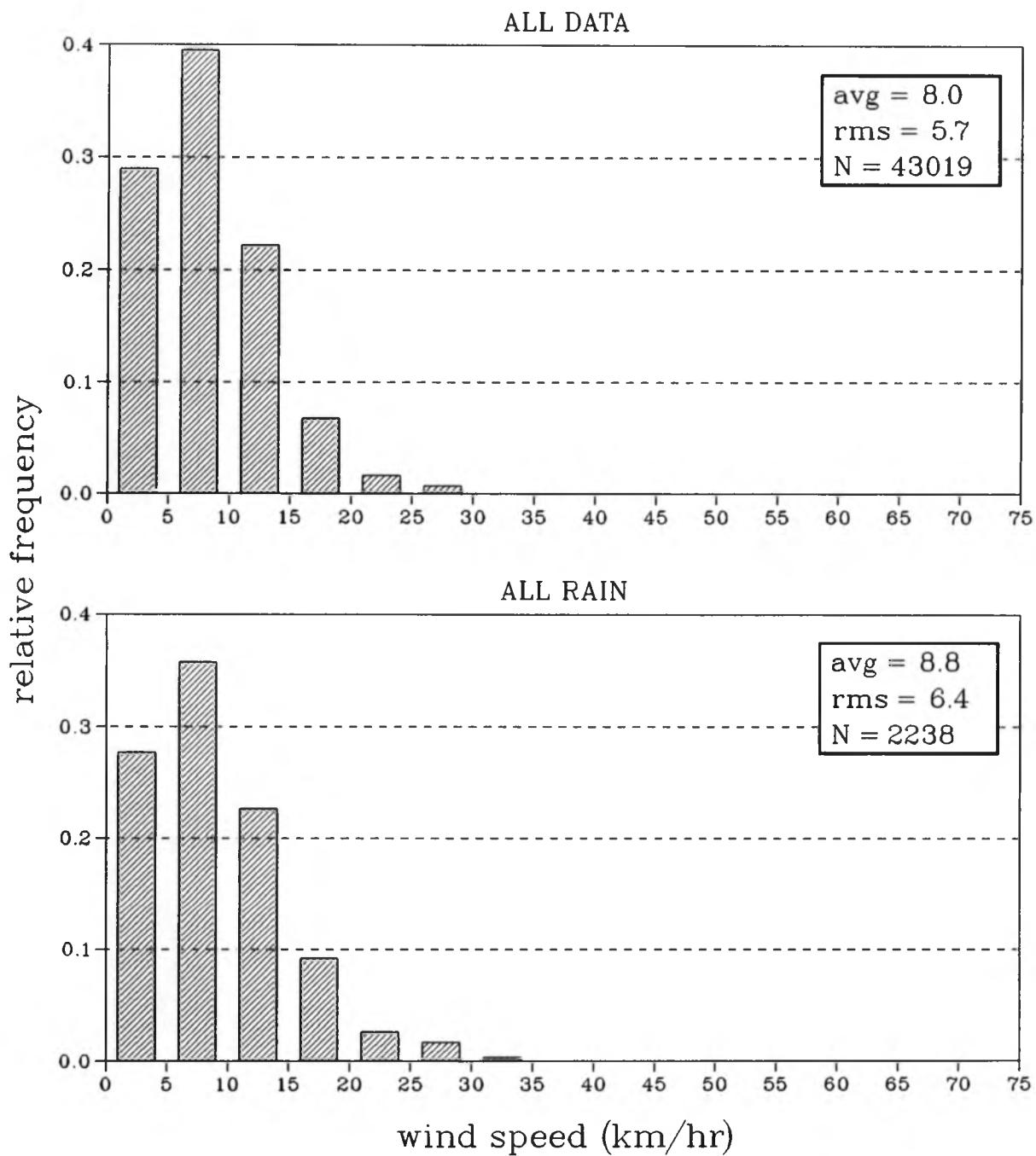


Figure 1a. Wind speed histograms for ALL DATA and ALL RAIN

REGINA

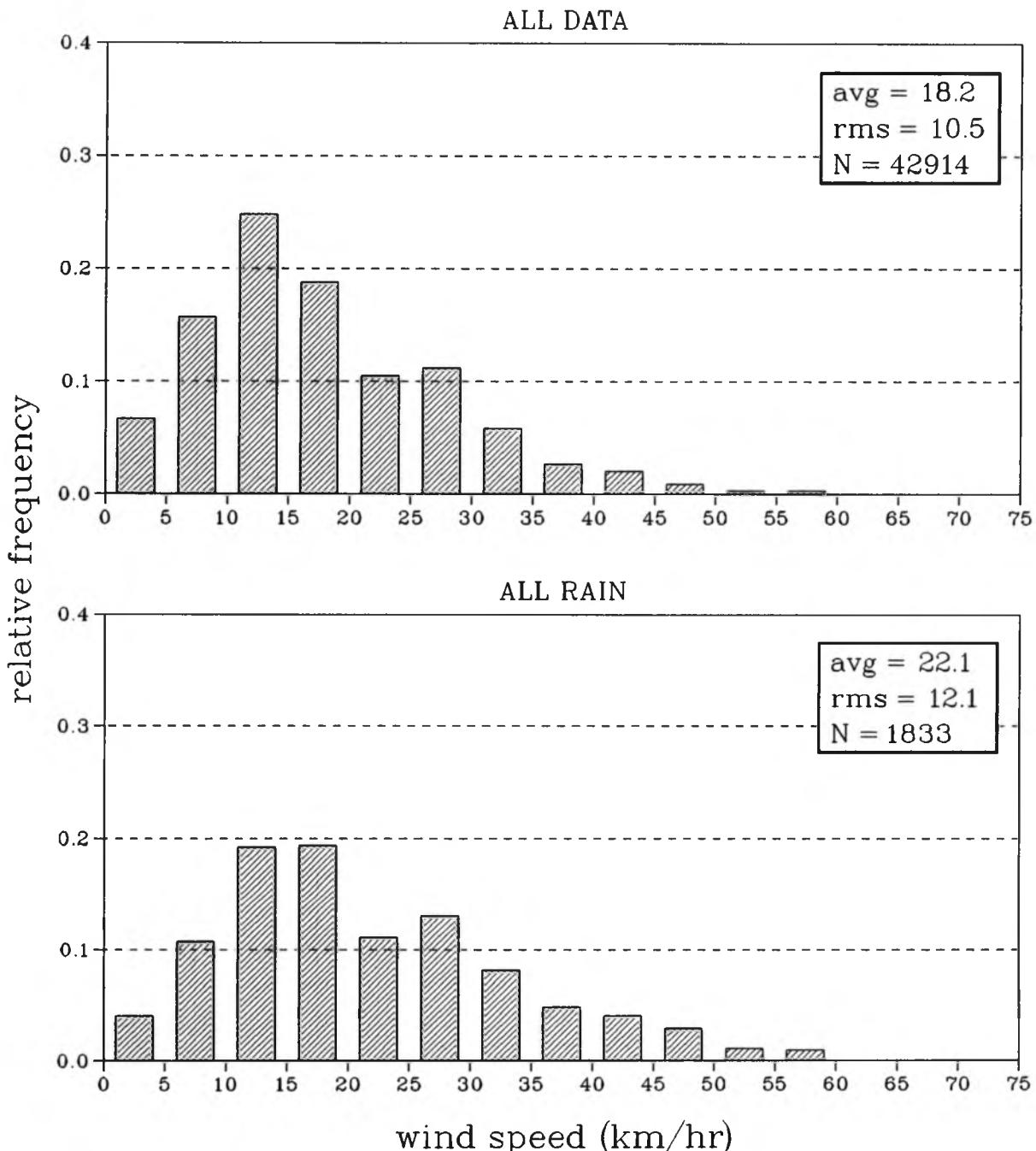


Figure 1b. Wind speed histograms for ALL DATA and ALL RAIN

LONDON

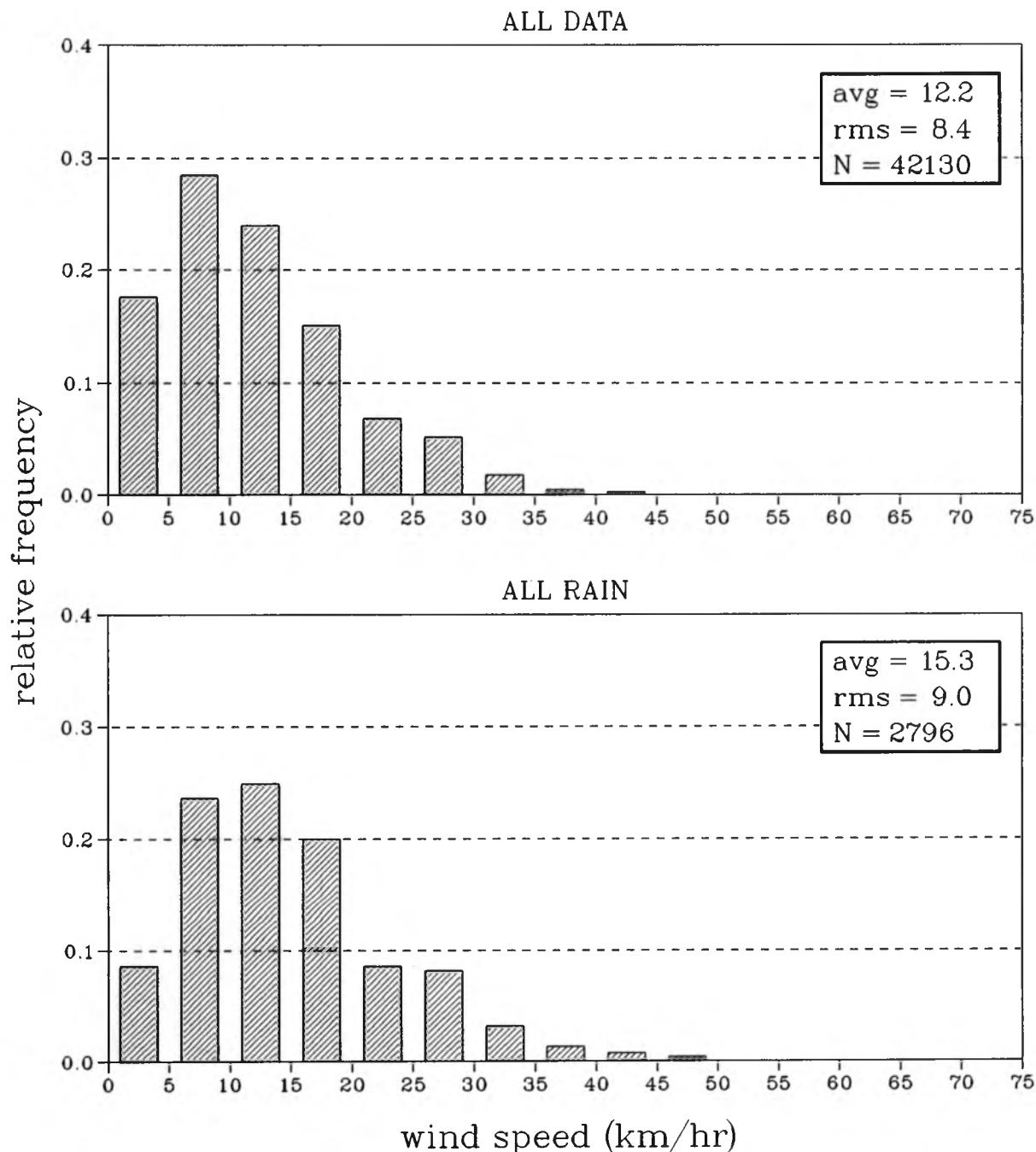


Figure 1c. Wind speed histograms for ALL DATA and ALL RAIN

OTTAWA

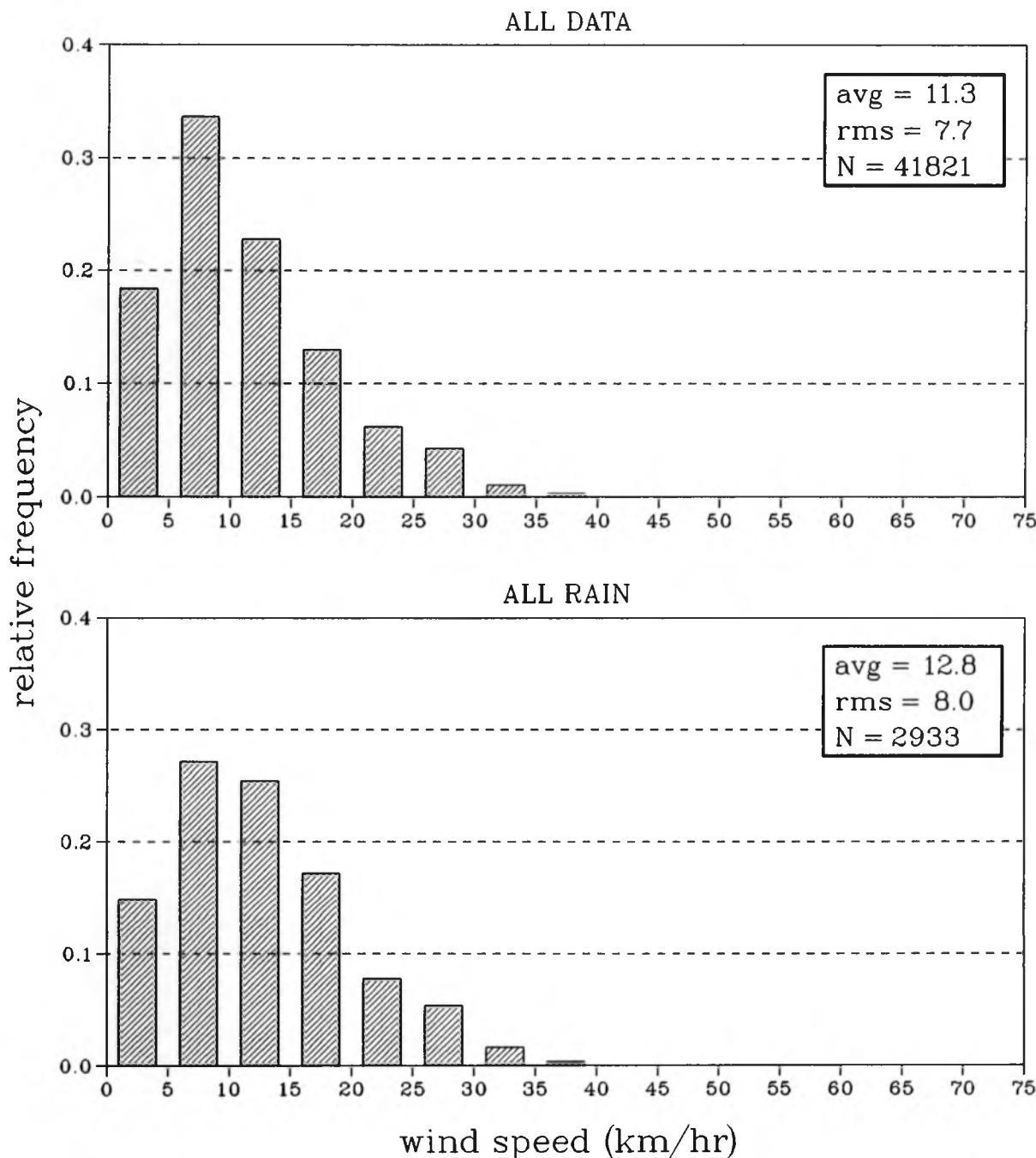


Figure 1d. Wind speed histograms for ALL DATA and ALL RAIN

ST. JOHN'S

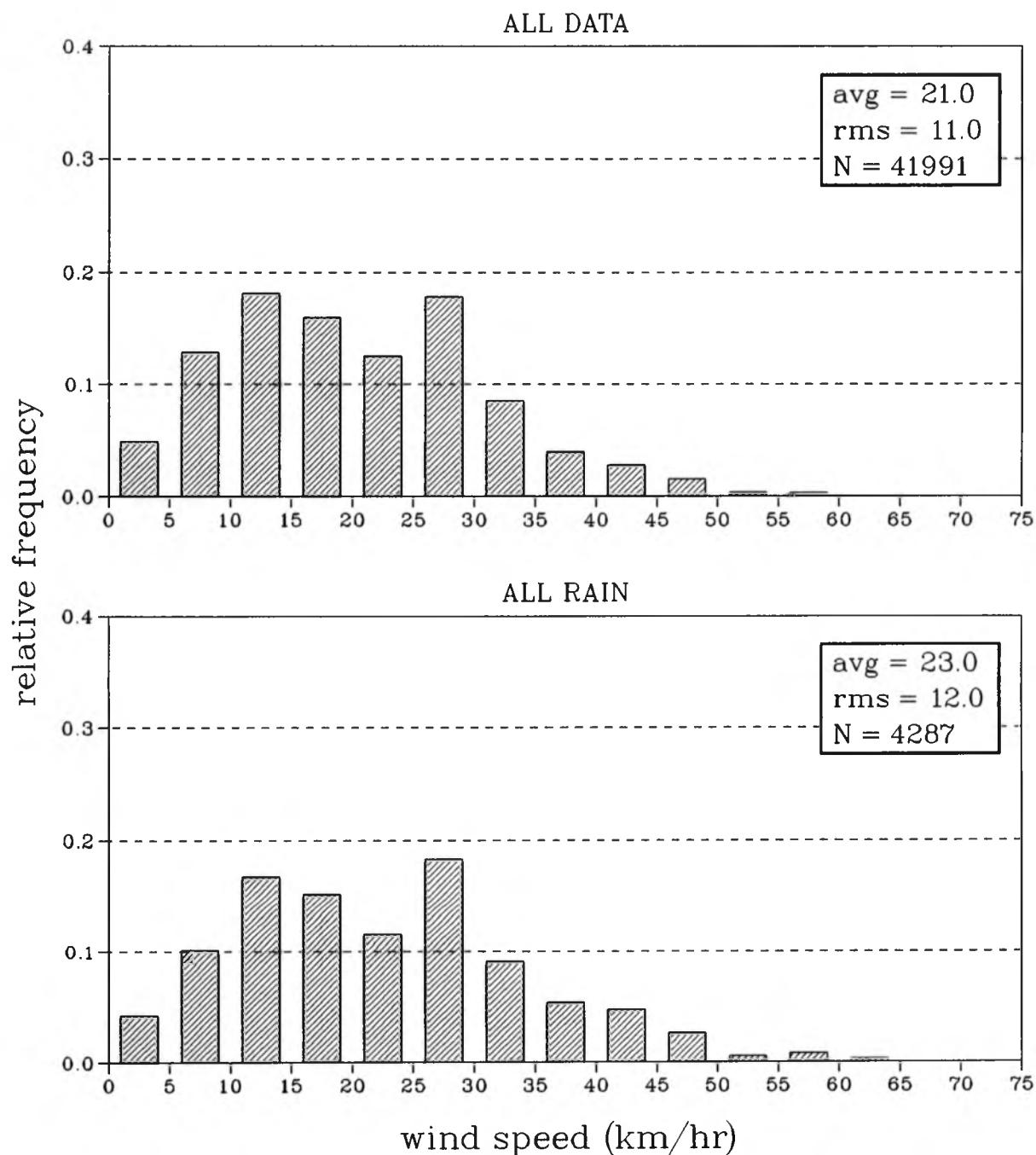


Figure 1e. Wind speed histograms for ALL DATA and ALL RAIN

VICTORIA

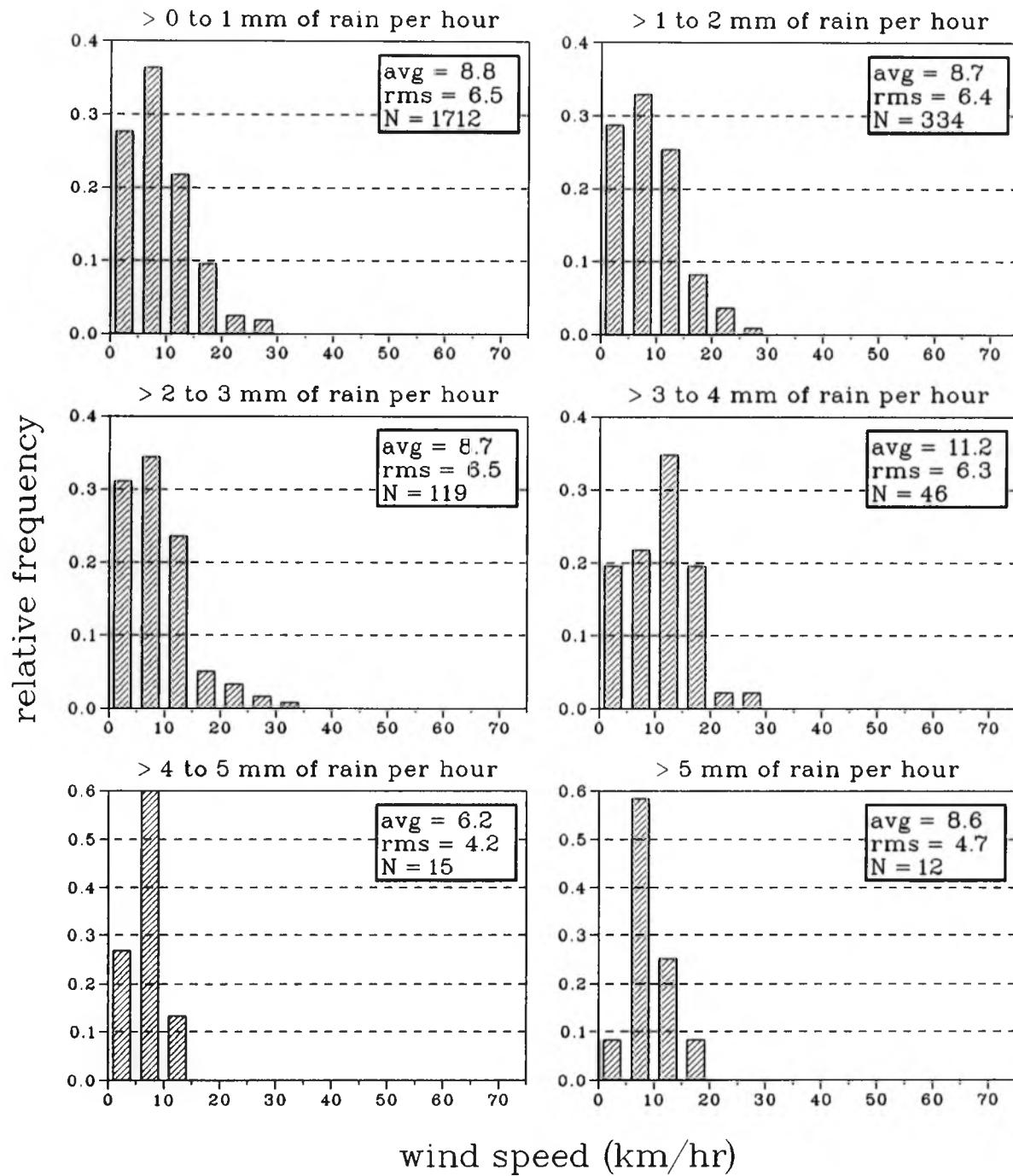


Figure 2a. Wind speed histograms for different hourly rainfall

REGINA

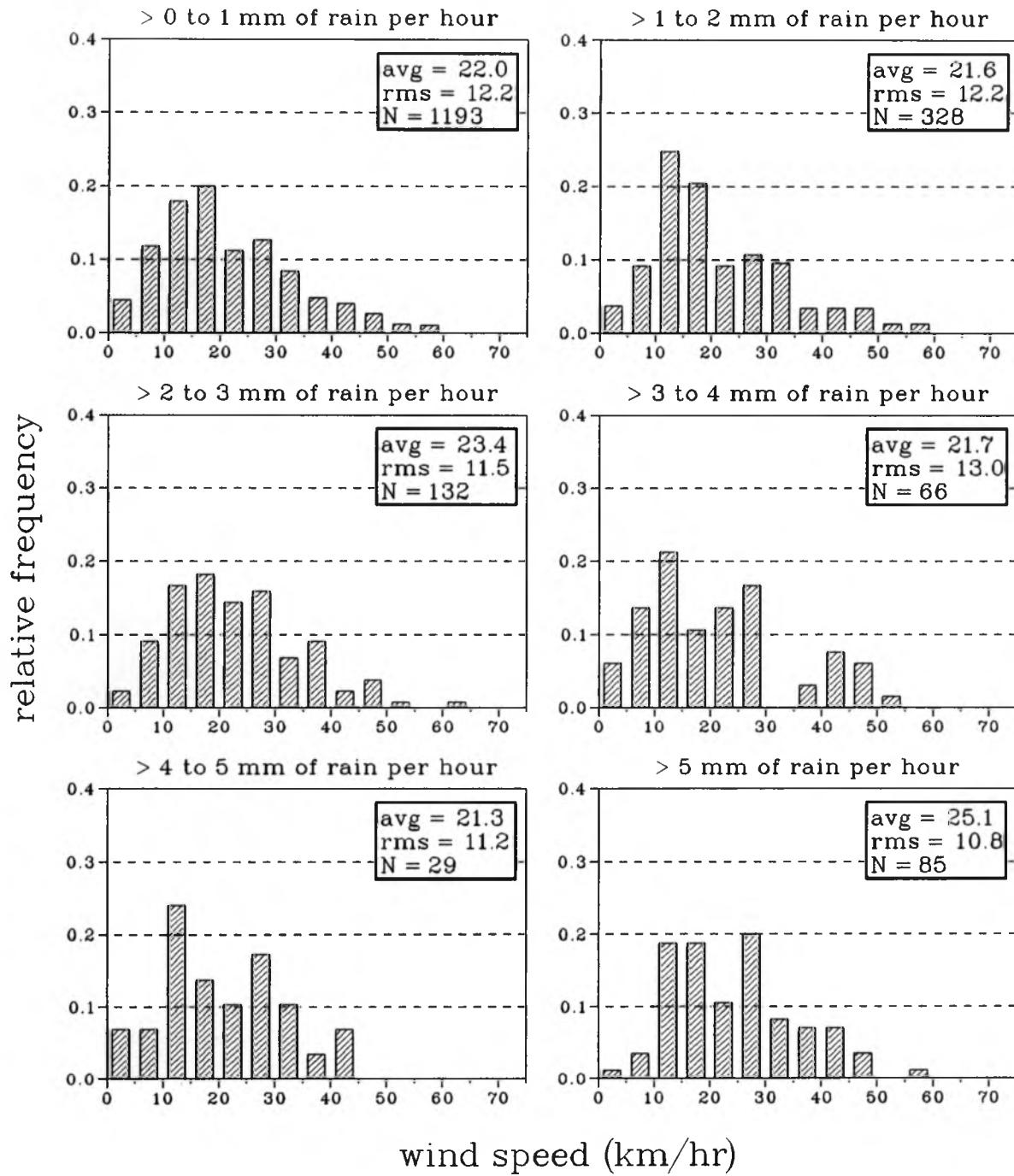


Figure 2b. Wind speed histograms for different hourly rainfall

LONDON

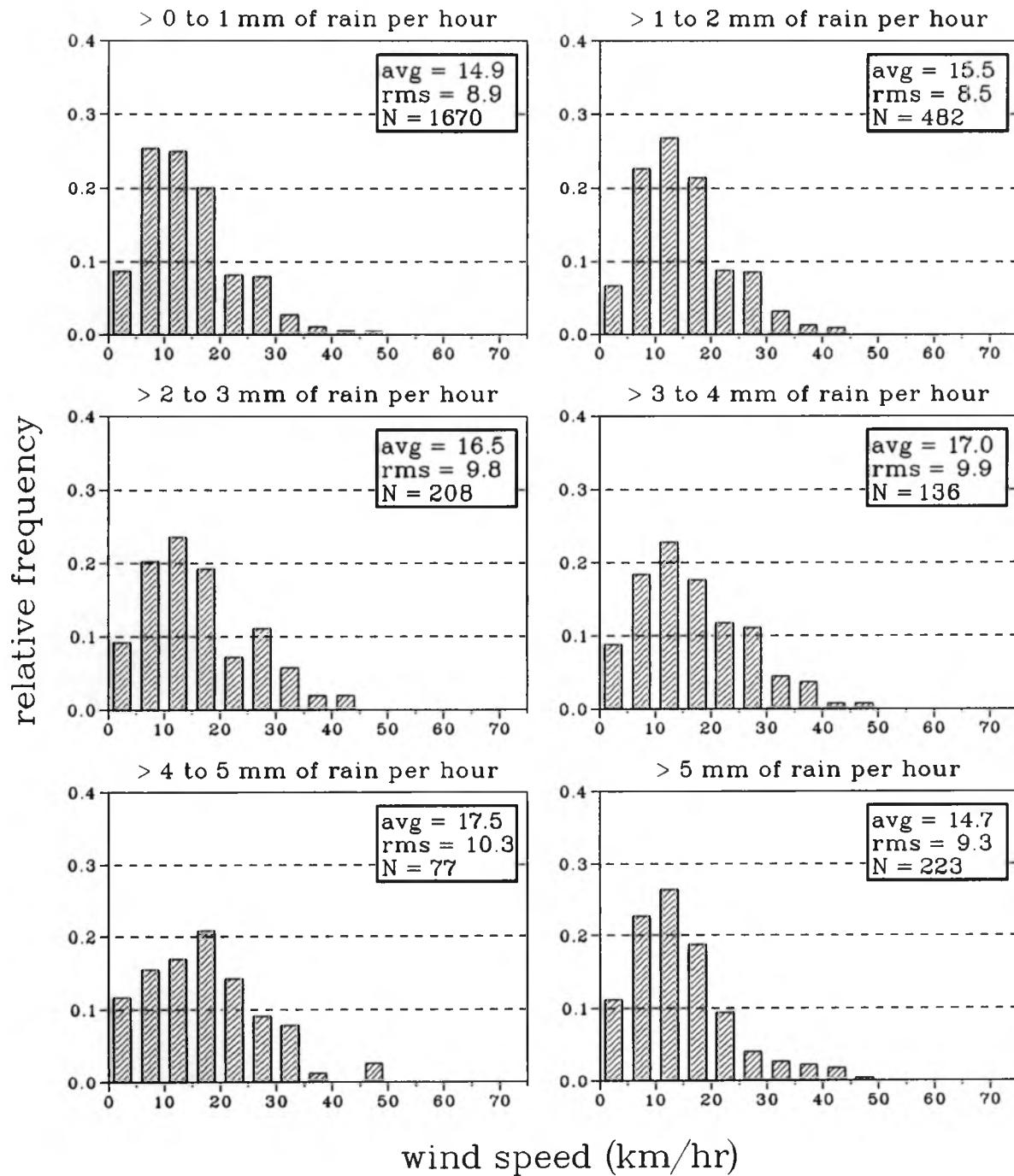


Figure 2c. Wind speed histograms for different hourly rainfall

OTTAWA

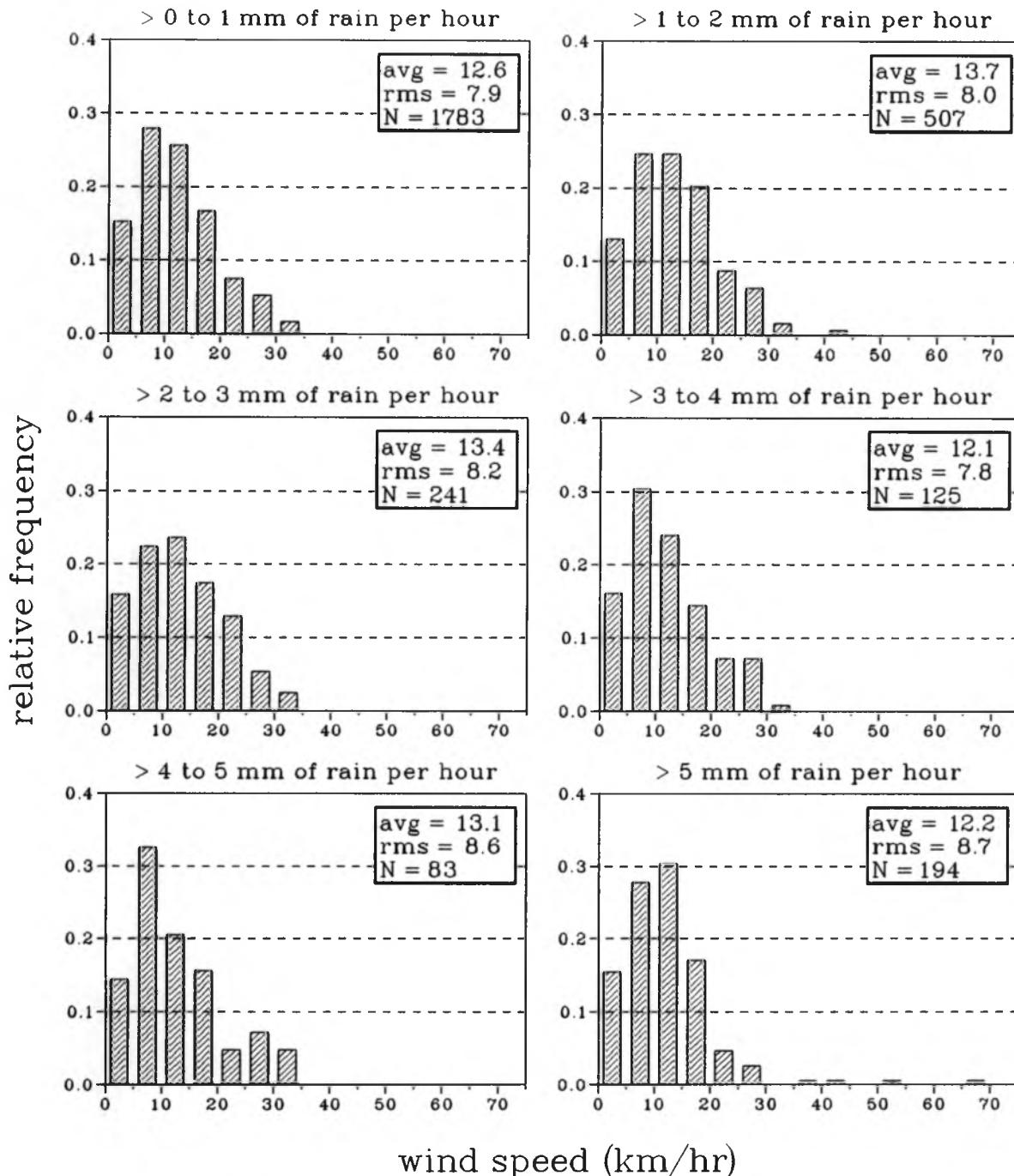


Figure 2d. Wind speed histograms for different hourly rainfall

ST. JOHN'S

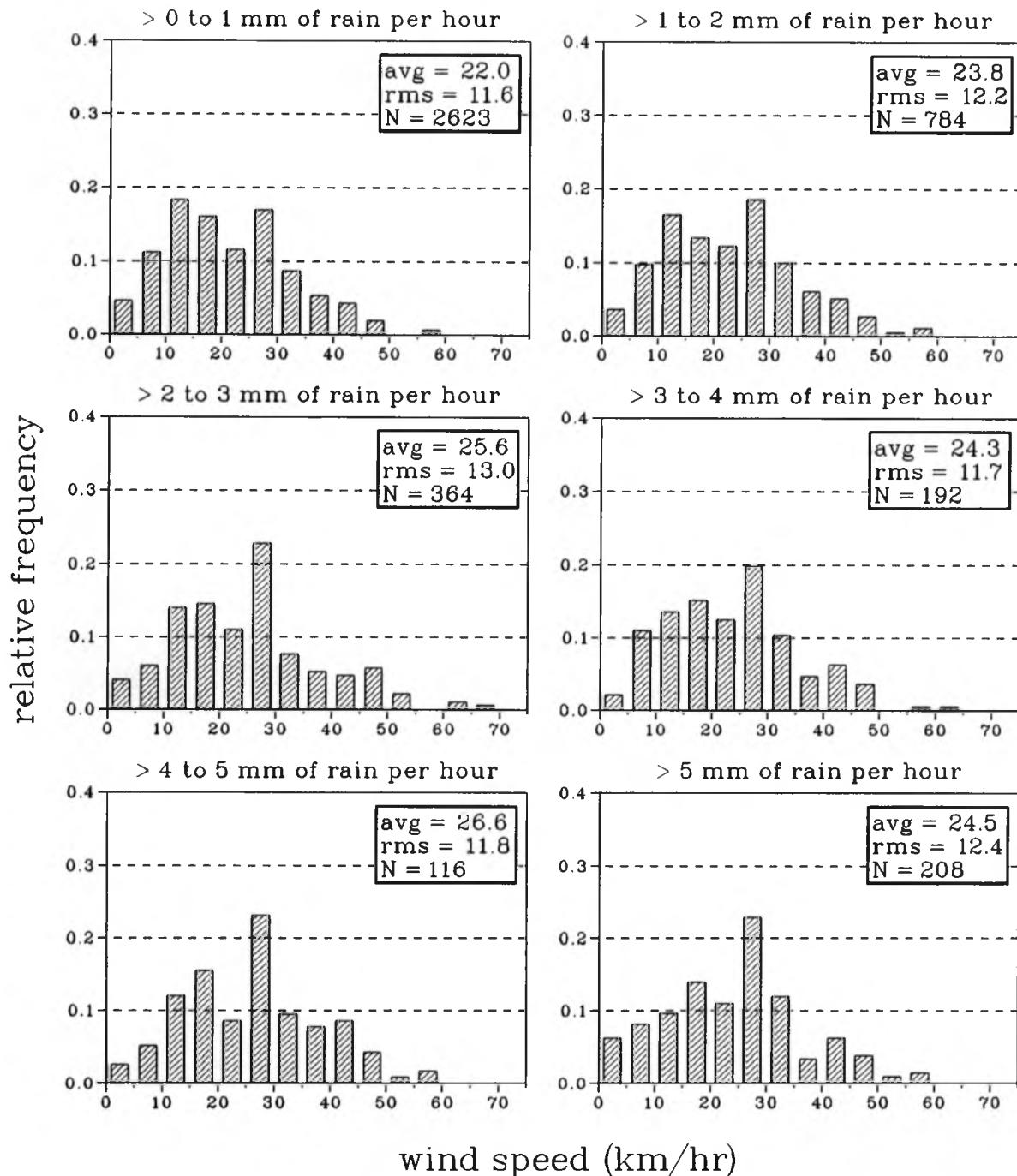


Figure 2e. Wind speed histograms for different hourly rainfall

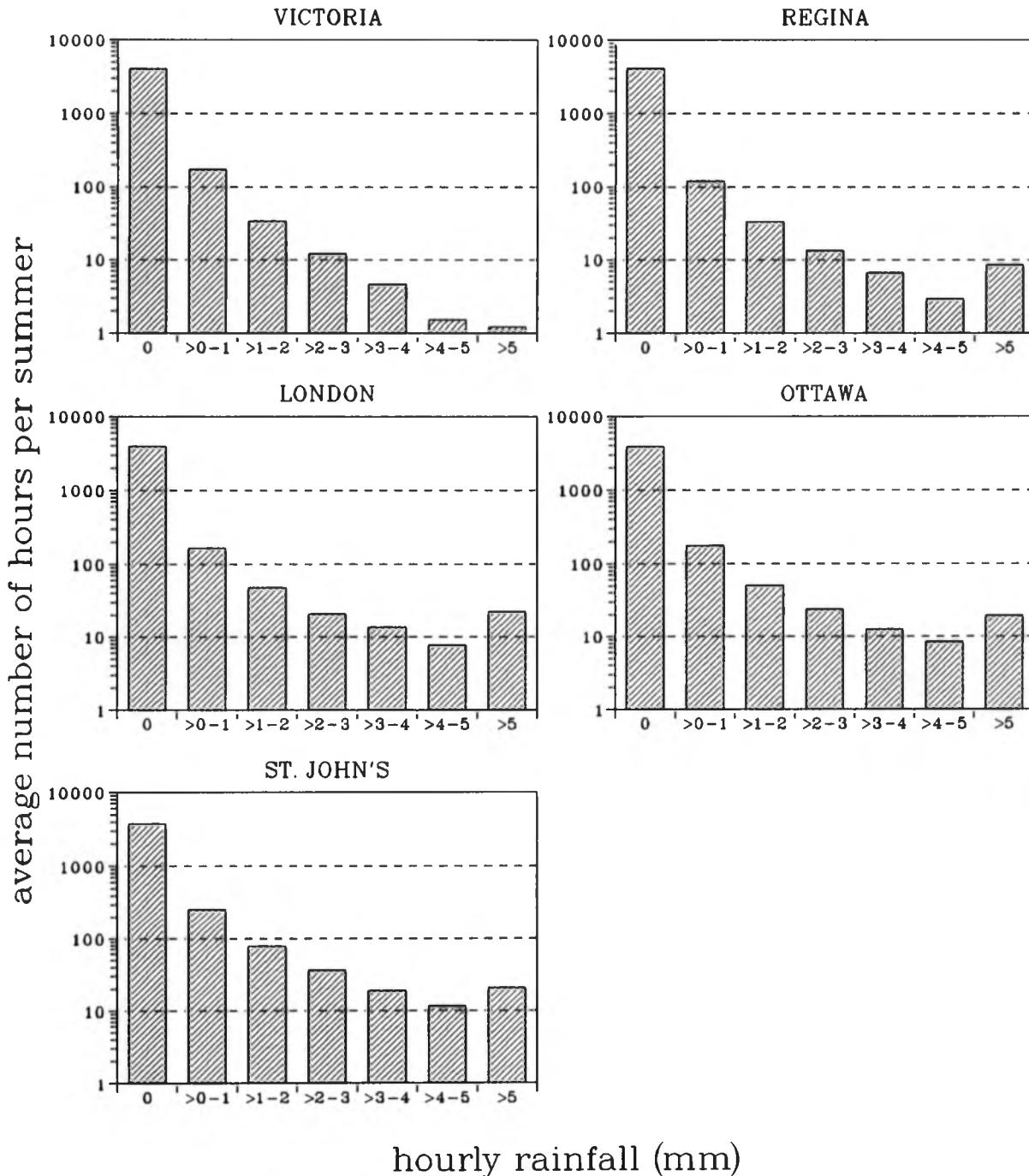


Figure 3a. Average number of hours per summer in each rainfall category (April through September)

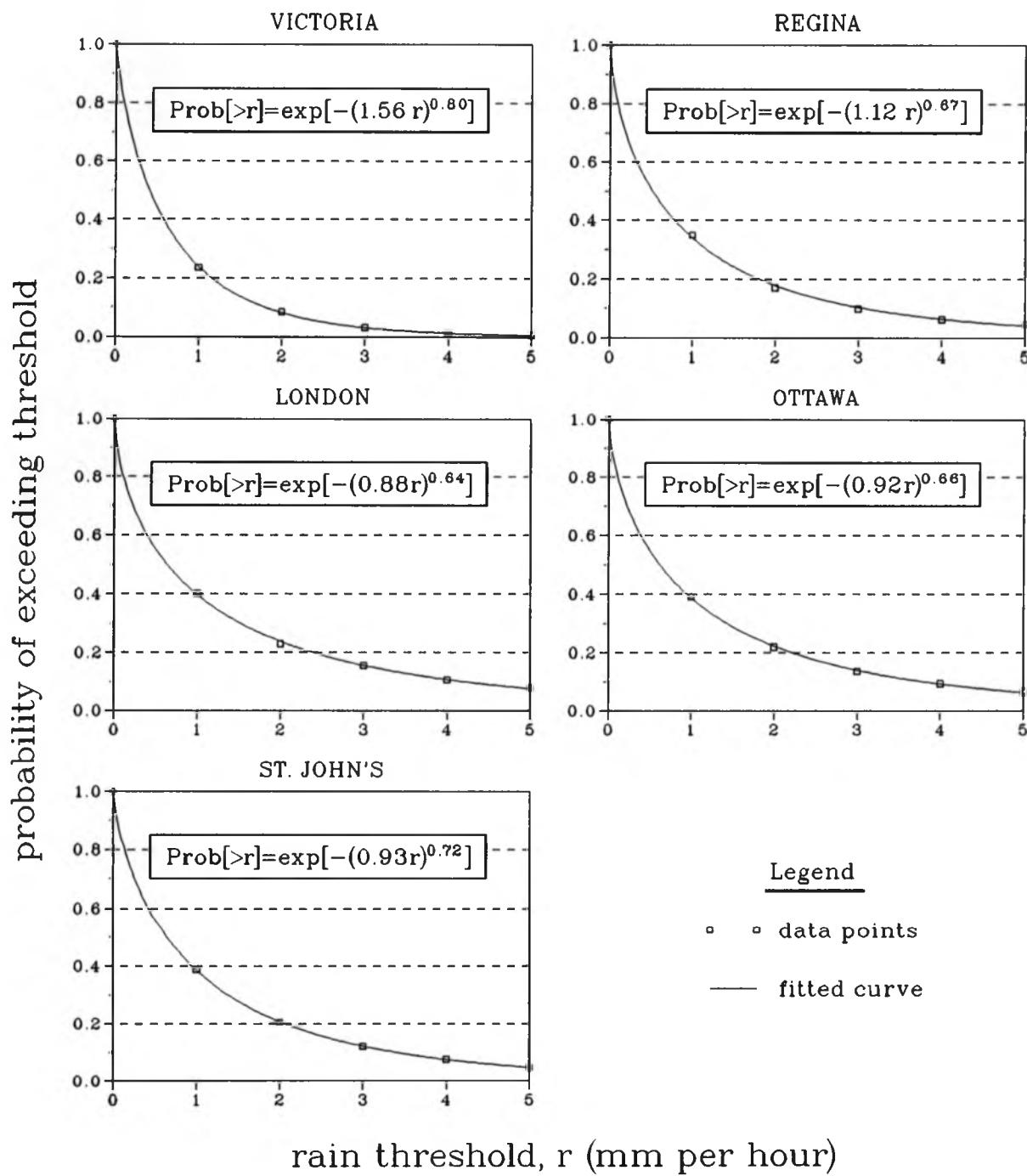
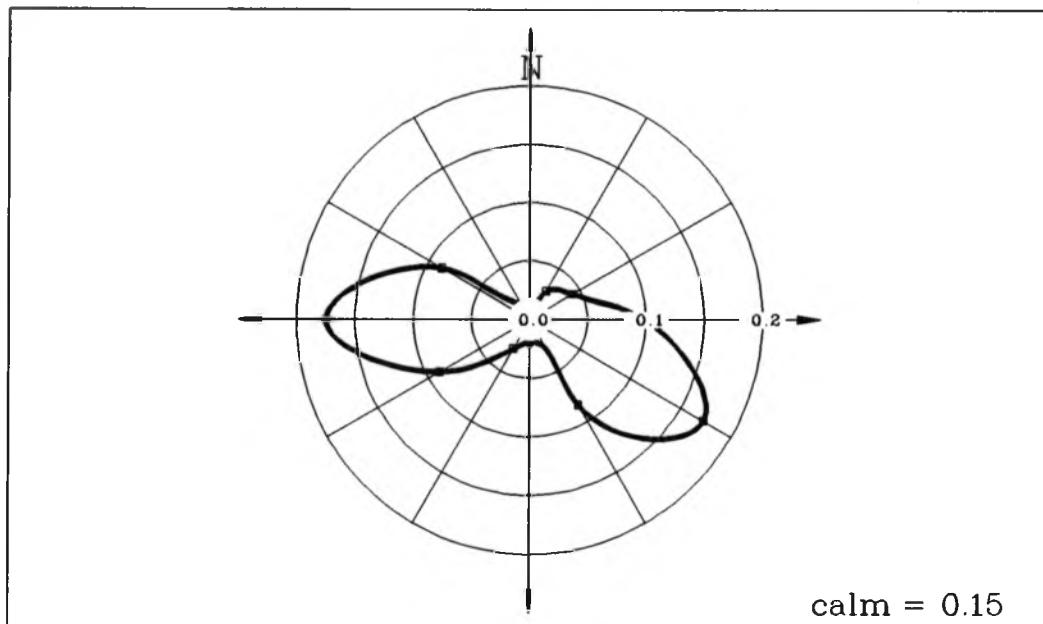


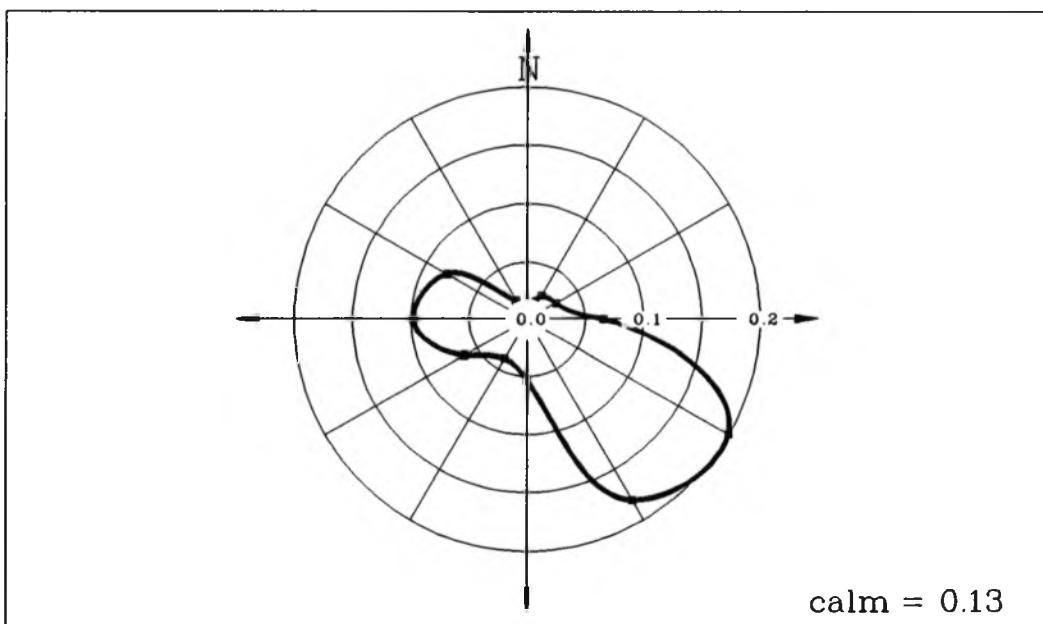
Figure 3b. Cumulative distribution of hourly rainfall

VICTORIA

ALL DATA



ALL RAIN



** radial axis denotes relative frequency **

Figure 4a. Wind roses for ALL DATA and ALL RAIN

REGINA

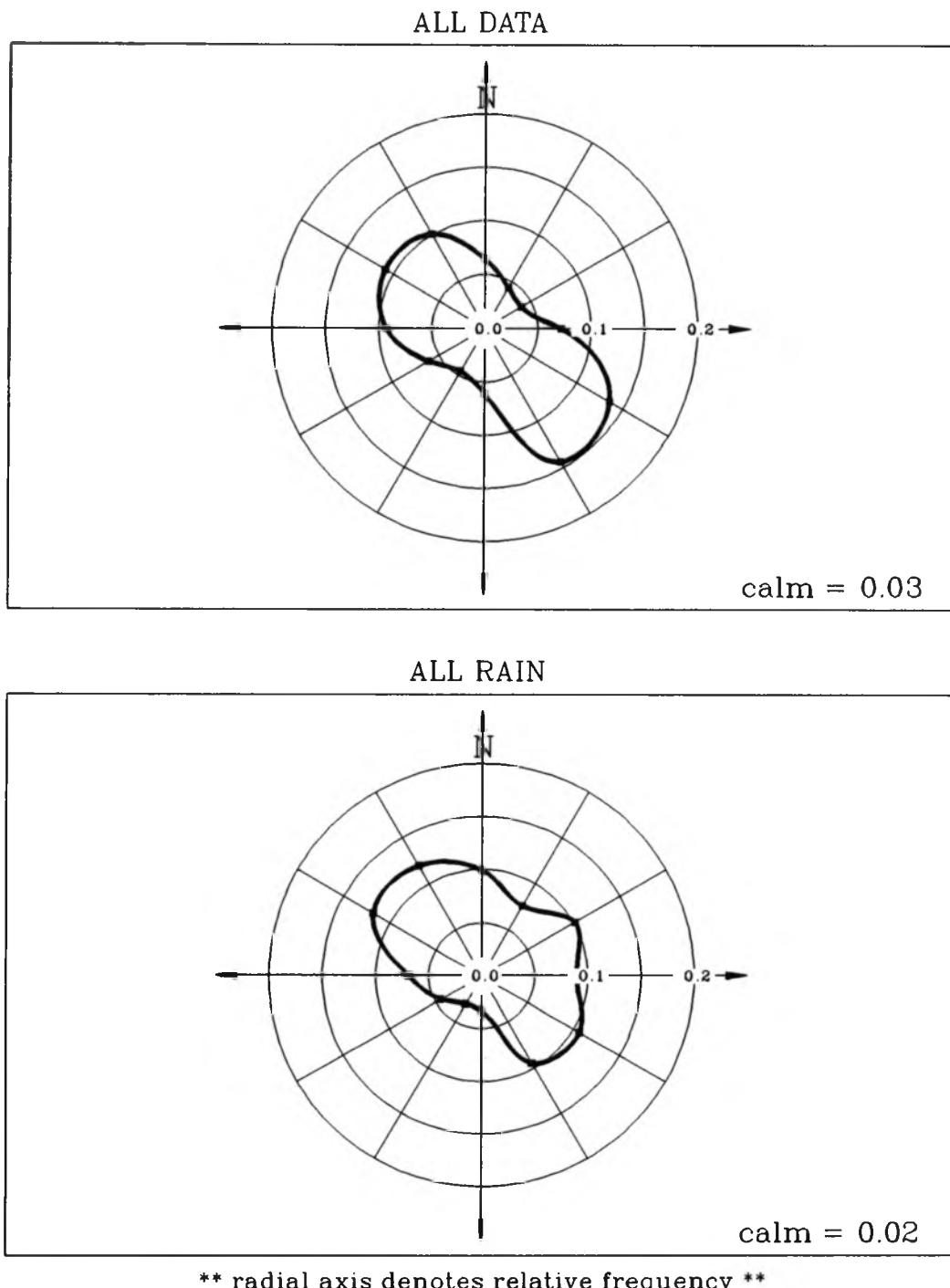


Figure 4b. Wind roses for ALL DATA and ALL RAIN

LONDON

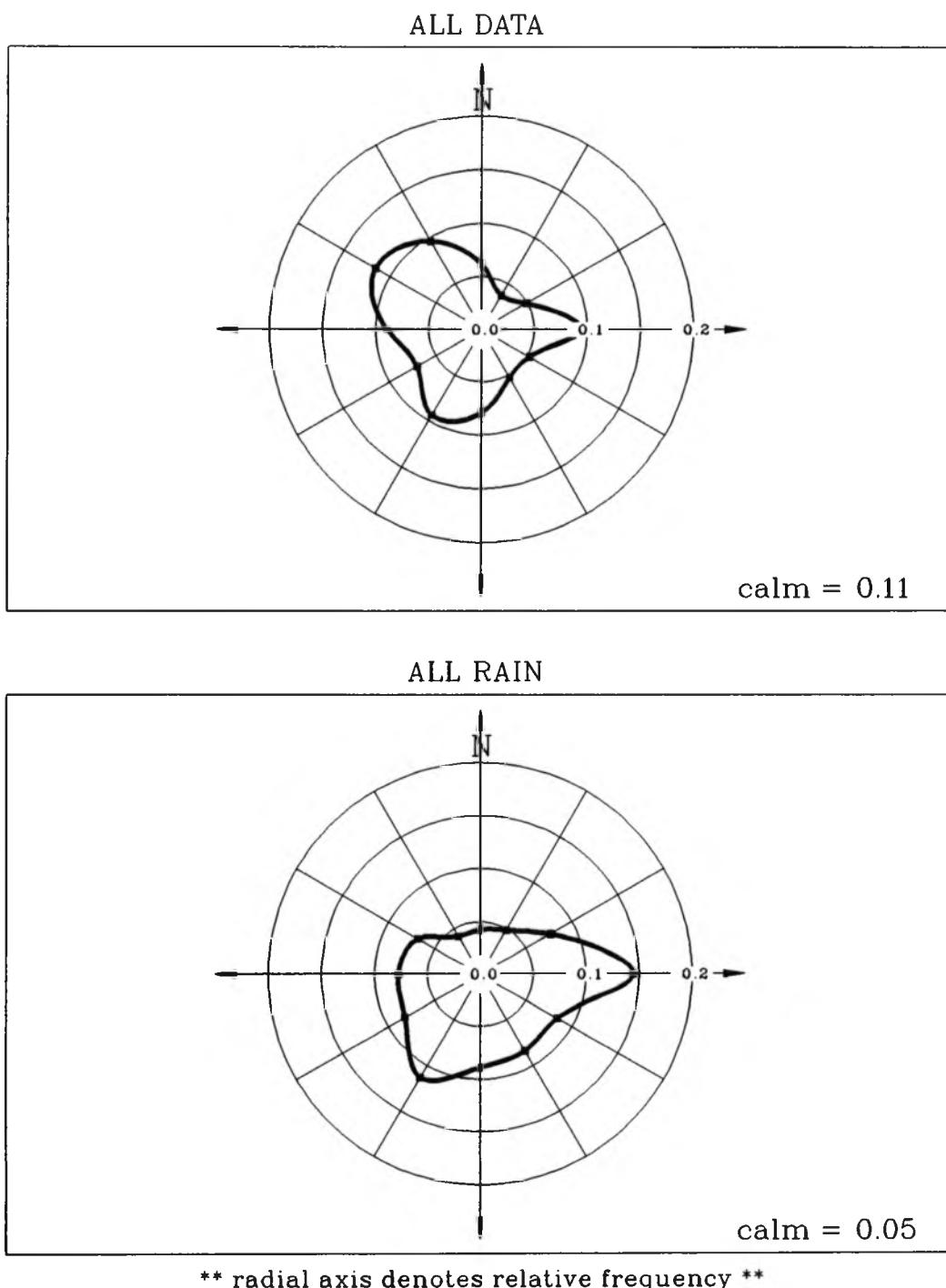
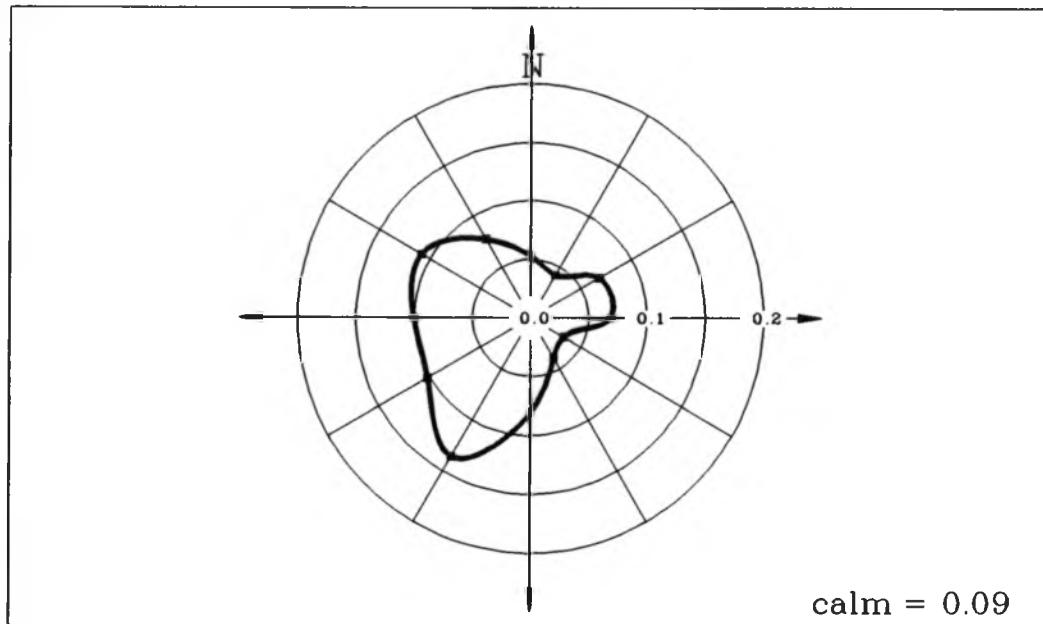


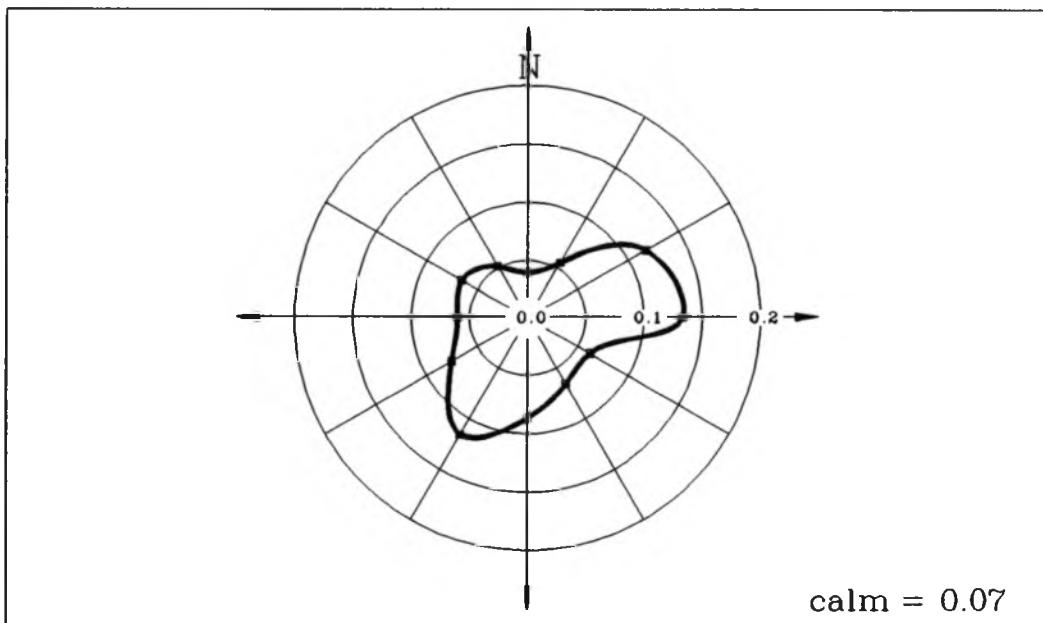
Figure 4c. Wind roses for ALL DATA and ALL RAIN

OTTAWA

ALL DATA



ALL RAIN

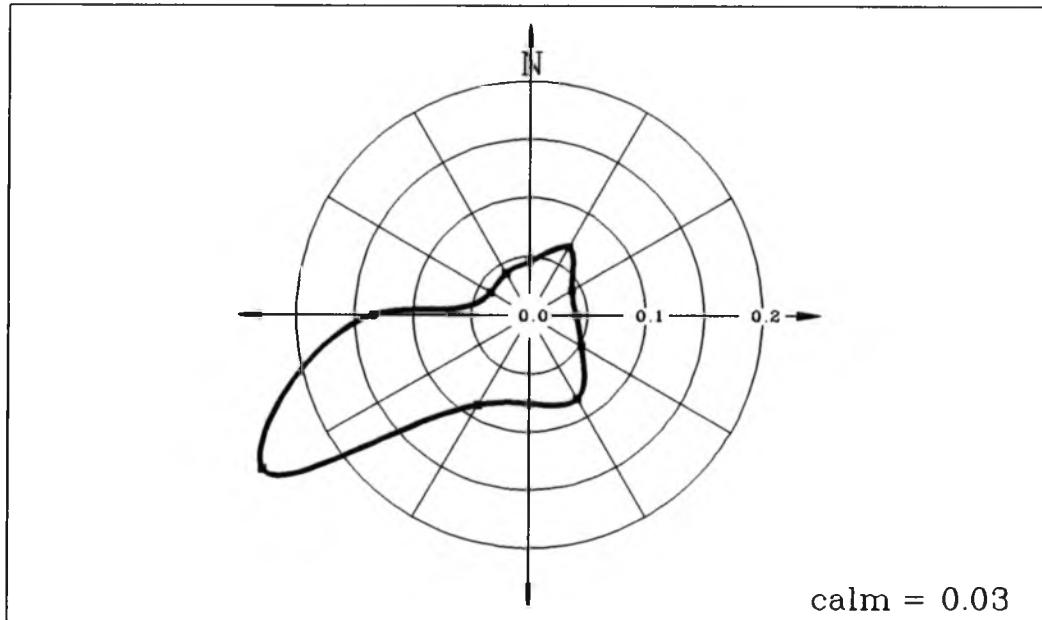


** radial axis denotes relative frequency **

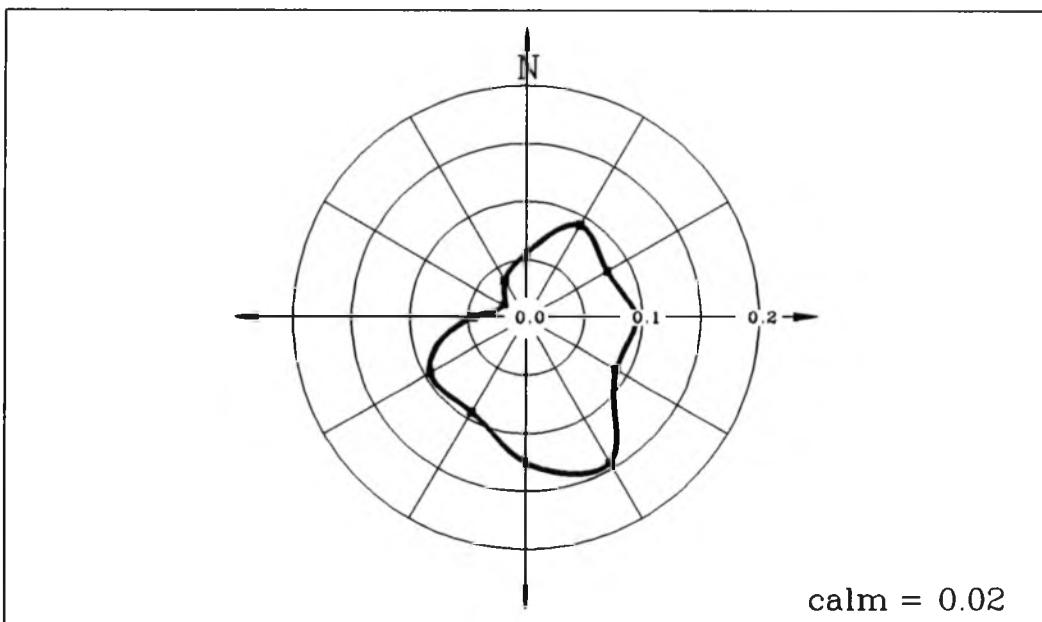
Figure 4d. Wind roses for ALL DATA and ALL RAIN

ST. JOHN'S

ALL DATA



ALL RAIN



** radial axis denotes relative frequency **

Figure 4e. Wind roses for ALL DATA and ALL RAIN

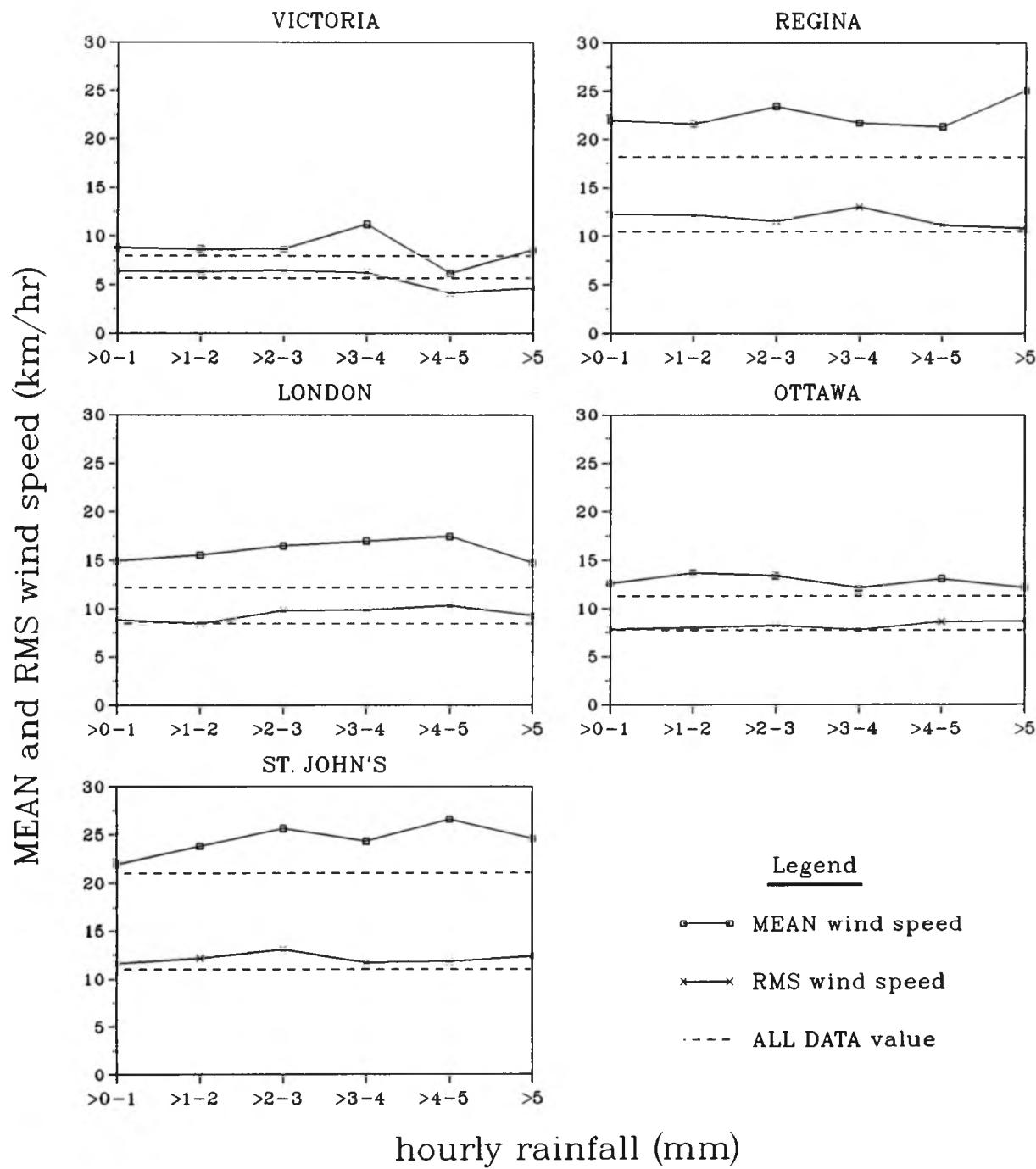


Figure 5. MEAN and RMS wind speed versus hourly rainfall

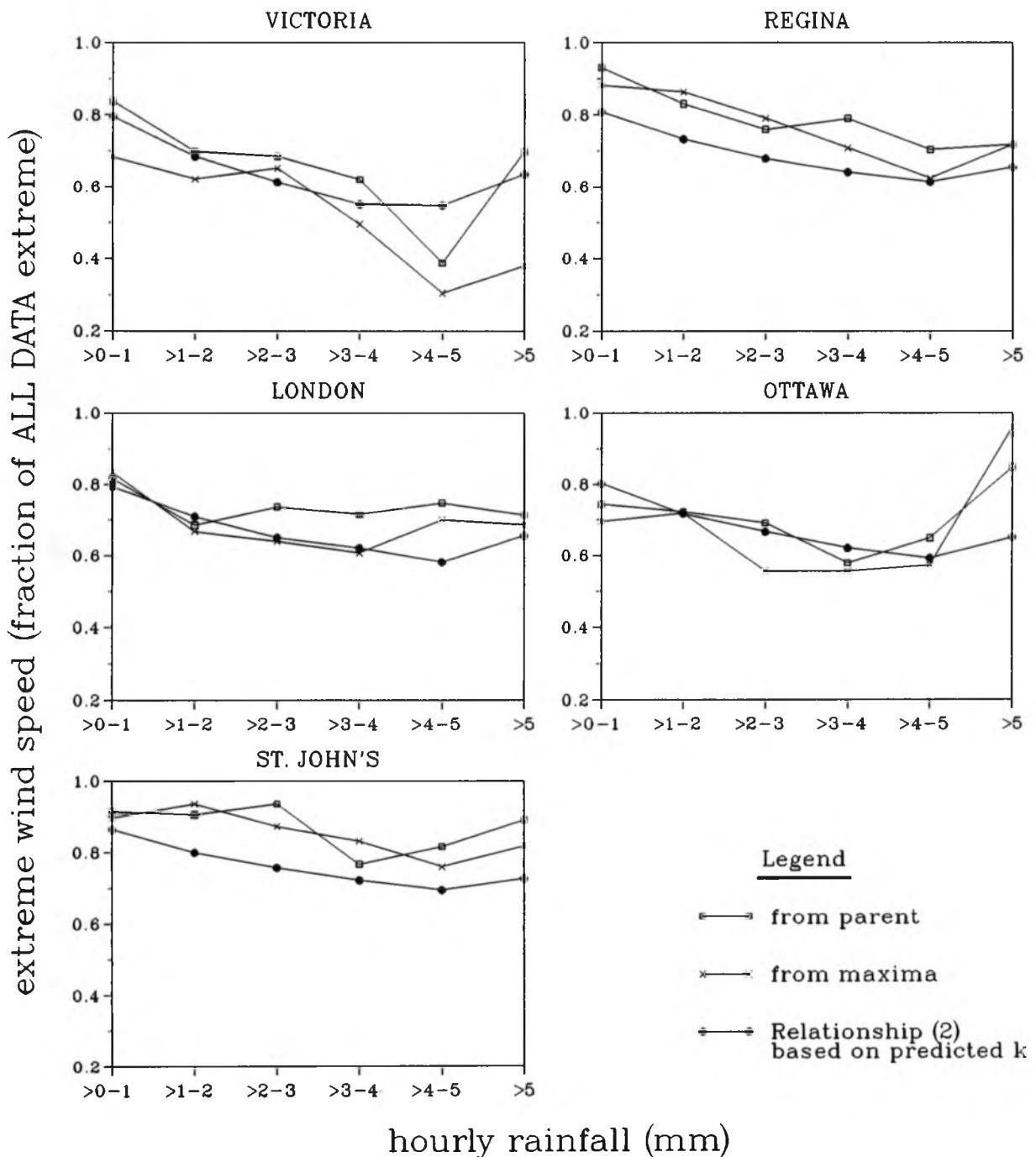


Figure 6. 1:10 annual extreme wind speed versus hourly rainfall

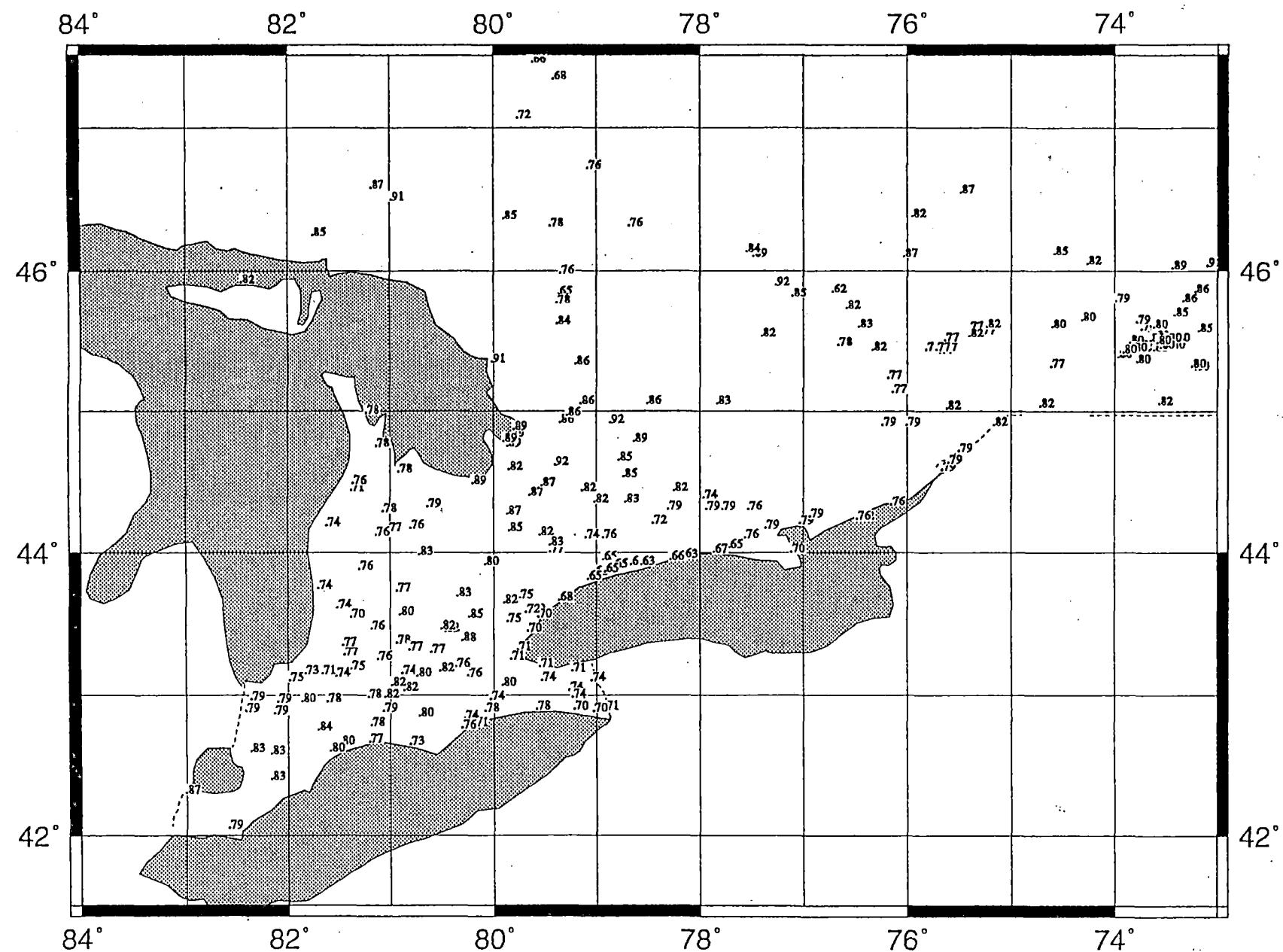


Figure 7. Ratios of 1:10 DRWP to 1:10 NBCC wind speeds for Ontario

APPENDIX I

TABLES OF HOURLY WIND PRESSURES AND DRIVING RAIN WIND PRESSURES FOR ALL CANADIAN STATIONS SHOWING THE RATIO OF 1/10 WIND SPEEDS FOR THE DRWP AND THE NBCC

Note: The ratio DRWP/HWP is the ratio of wind speeds which is the square root of the ratio of pressures.

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10	
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5			
			2.5%	1.0%								
BRITISH COLUMBIA:												
ABBOTSFORD	49 4	122 11	-10	-11	0.42	0.55	120.	160.	200.	0.69		
AGASSIZ	49 14	121 46	-13	-15	0.55	0.75	120.	160.	200.	0.60		
ALBERNI	49 16	124 49	-5	-7	0.47	0.58	180.	220.	280.	0.77		
ASHCROFT	50 43	121 17	-25	-28	0.28	0.35	60.	80.	100.	0.60		
BEATTON RIVER	57 23	121 24	-37	-39	0.22	0.27	60.	80.	100.	0.67		
BURNS LAKE	54 14	125 45	-30	-33	0.30	0.36	60.	100.	120.	0.63		
CACHE CREEK	50 49	121 20	-25	-28	0.29	0.35	60.	80.	100.	0.59		
CAMPBELL RIVER	49 59	125 14	-7	-9	0.46	0.58	200.	260.	300.	0.81		
CARMI	49 29	119 7	-24	-26	0.24	0.33	40.	60.	80.	0.58		
CASTLEGAR	49 19	117 39	-19	-22	0.23	0.30	40.	60.	80.	0.59		
CHETWYND	55 0	121 38	-35	-38	0.32	0.37	40.	60.	80.	0.50		
CHILLIWACK	49 10	121 57	-12	-13	0.48	0.63	120.	160.	200.	0.65		
CLOVERDALE	49 6	122 44	-8	-10	0.46	0.58	120.	160.	200.	0.66		
COMOX	49 41	124 55	-7	-9	0.45	0.58	200.	260.	300.	0.82		
COURTENAY	49 41	124 59	-7	-9	0.45	0.58	200.	260.	300.	0.82		
CRANBROOK	49 30	115 46	-27	-30	0.22	0.29	60.	100.	120.	0.74		
CRESCENT VALLEY	49 27	117 33	-20	-23	0.22	0.29	60.	80.	100.	0.67		
CROFTON	48 52	123 21	-6	-8	0.48	0.58	140.	160.	220.	0.68		
DAWSON CREEK	55 46	120 14	-36	-39	0.31	0.37	80.	100.	140.	0.67		
DOG CREEK	51 35	122 18	-28	-30	0.31	0.37	80.	100.	120.	0.62		
DUNCAN	48 47	123 42	-6	-8	0.48	0.58	160.	180.	240.	0.71		
ELKO	49 18	115 7	-28	-31	0.27	0.37	60.	100.	140.	0.72		
FERNIE	49 30	115 4	-29	-32	0.33	0.43	80.	100.	140.	0.65		
FORT NELSON	58 49	122 43	-40	-42	0.19	0.24	60.	80.	100.	0.73		
FORT ST. JOHN	56 15	120 51	-36	-38	0.31	0.36	80.	100.	140.	0.67		
GLACIER	51 16	117 31	-27	-30	0.24	0.29	60.	80.	100.	0.65		
GOLDEN	51 18	116 58	-28	-31	0.27	0.32	60.	100.	120.	0.67		
GRAND FORKS	49 2	118 27	-20	-22	0.26	0.36	60.	80.	100.	0.62		
GREENWOOD	49 6	118 41	-20	-22	0.29	0.39	60.	80.	100.	0.59		
HANEY	49 13	122 36	-9	-11	0.47	0.60	120.	160.	220.	0.68		
HOPE	49 23	121 27	-16	-18	0.41	0.55	120.	140.	200.	0.70		
KAMLOOPS	50 40	120 19	-25	-28	0.30	0.37	60.	80.	120.	0.63		
KASLO	49 55	116 54	-23	-26	0.34	0.28	60.	80.	100.	0.54		
KELOWNA	49 53	119 29	-17	-20	0.22	0.43	60.	80.	100.	0.67		
KIMBERLEY	49 51	115 59	-26	-29	0.22	0.29	80.	100.	120.	0.74		
KITIMAT	54 3	128 38	-16	-18	0.22	0.26	160.	220.	260.	1.09		
LANGLEY	49 6	122 39	-8	-10	0.45	0.58	120.	160.	220.	0.70		
LILLOOET	50 41	121 56	-23	-25	0.32	0.39	80.	100.	120.	0.61		
LYTTON	50 14	121 34	-19	-22	0.31	0.39	60.	80.	100.	0.57		
MACKENZIE	55 19	123 5	-35	-38	0.24	0.29	40.	60.	80.	0.58		
MASSET	54 1	132 9	-7	-9	0.49	0.58	350.	400.	500.	1.01		
MCBRIDE	53 18	120 12	-34	-37	0.27	0.32	40.	60.	80.	0.54		
MCLEOD LAKE	54 59	123 2	-35	-37	0.24	0.29	40.	60.	80.	0.58		
MERRITT	50 6	120 47	-26	-29	0.32	0.39	60.	80.	100.	0.56		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C) 2.5%	1.0%	1/10	1/30	1/2	1/5	1/10	
MISSION CITY	49 9	122 19	-9	-11	0.47	0.60	120.	160.	220.	0.68
MONTROSE	49 5	117 35	-17	-20	0.22	0.30	40.	60.	80.	0.60
NAKUSP	50 14	117 48	-24	-27	0.24	0.30	40.	60.	80.	0.58
NANAIMO	49 10	123 56	-7	-9	0.47	0.58	160.	200.	240.	0.71
NELSON	49 29	117 17	-20	-24	0.22	0.29	40.	60.	80.	0.60
NEW WESTMINSTER	49 13	122 55	-8	-10	0.44	0.55	120.	160.	220.	0.71
NORTH VANCOUVER	49 20	123 1	-7	-9	0.44	0.55	120.	160.	220.	0.71
OCEAN FALLS	52 21	127 41	-12	-14	0.47	0.55	300.	350.	400.	0.92
100 MILE HOUSE	51 39	121 17	-28	-31	0.30	0.36	40.	60.	100.	0.58
OSOYOOS	49 10	119 30	-16	-18	0.30	0.43	40.	60.	100.	0.58
PENTICTON	49 30	119 35	-16	-18	0.40	0.52	40.	60.	80.	0.45
PORT ALBERNI	49 14	124 48	-5	-7	0.47	0.58	180.	240.	280.	0.77
PORT HARDY	50 42	127 25	-5	-7	0.49	0.58	180.	220.	280.	0.76
PORT MCNEIL	50 35	127 6	-5	-7	0.49	0.58	180.	260.	280.	0.76
POWELL RIVER	49 50	124 31	-9	-11	0.42	0.55	180.	220.	260.	0.79
PRINCE GEORGE	53 55	122 45	-33	-36	0.25	0.30	60.	80.	100.	0.63
PRINCE RUPERT	54 19	130 19	-14	-16	0.42	0.50	180.	240.	280.	0.82
PRINCETON	49 28	120 31	-27	-30	0.24	0.32	60.	80.	120.	0.71
QUALICUM BEACH	49 21	124 27	-7	-9	0.46	0.58	180.	200.	280.	0.78
QUESNEL	52 29	122 29	-33	-35	0.25	0.29	60.	80.	100.	0.63
REVELSTOKE	50 59	118 12	-26	-29	0.24	0.29	60.	80.	100.	0.65
RICHMOND	49 9	123 6	-7	-9	0.45	0.55	120.	160.	220.	0.70
SALMON ARM	50 41	119 17	-23	-26	0.29	0.35	60.	80.	100.	0.59
SANDSPIT	53 15	131 49	-6	-7	0.54	0.63	450.	500.	550.	1.01
SIDNEY	48 39	123 24	-6	-8	0.46	0.55	140.	160.	240.	0.72
SMITHERS	54 47	127 10	-29	-31	0.31	0.37	80.	120.	140.	0.67
SMITH RIVER	59 53	126 26	-46	-48	0.19	0.25	20.	40.	60.	0.56
SQUAMISH	49 42	123 10	-11	-13	0.38	0.50	120.	160.	200.	0.73
STEWART	55 56	129 59	-23	-25	0.32	0.39	140.	180.	200.	0.79
TAYLOR	56 10	120 41	-36	-38	0.32	0.37	80.	100.	140.	0.66
TERRACE	54 31	128 36	-20	-22	0.36	0.43	160.	200.	260.	0.85
TOFINO	49 9	125 55	-2	-4	0.54	0.63	260.	300.	350.	0.81
TRAIL	49 6	117 42	-17	-20	0.17	0.24	40.	60.	80.	0.69
UCLUELET	48 57	125 33	-2	-4	0.54	0.63	260.	280.	350.	0.81
VANCOUVER	49 15	123 7	-7	-9	0.45	0.55	120.	160.	220.	0.70
VERNON	50 16	119 16	-20	-23	0.32	0.39	60.	80.	100.	0.56
VICTORIA	48 26	123 22	-5	-7	0.48	0.58	180.	220.	260.	0.74
WILLIAMS LAKE	52 8	122 9	-31	-34	0.30	0.35	60.	80.	100.	0.58
YOUBOU	48 53	124 13	-5	-7	0.46	0.55	180.	200.	240.	0.72

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C)		2.5%	1.0%	1/10	1/30	1/2	
=====										
ALBERTA:										
ATHABASCA	54 43	113 17	-35	-38	0.30	0.37	60.	80.	100.	0.58
BANFF	51 10	115 34	-30	-32	0.39	0.45	80.	120.	140.	0.60
BARRHEAD	54 8	114 24	-34	-37	0.32	0.39	60.	100.	120.	0.61
BEAVERLODGE	55 13	119 26	-35	-38	0.27	0.33	80.	100.	140.	0.72
BROOKS	50 35	111 53	-32	-34	0.39	0.48	160.	220.	260.	0.82
CALGARY	51 3	114 5	-31	-33	0.40	0.46	160.	220.	260.	0.81
CAMPSIE	54 8	114 39	-34	-37	0.32	0.39	60.	100.	120.	0.61
CAMROSE	53 1	112 50	-33	-35	0.21	0.29	120.	160.	180.	0.93
CARDSTON	49 12	113 18	-30	-33	0.74	0.93	100.	140.	200.	0.52
CLARESHOLM	50 2	113 35	-31	-34	0.66	0.80	140.	200.	220.	0.58
COLD LAKE	54 27	110 10	-36	-38	0.31	0.37	80.	140.	180.	0.76
COLEMAN	49 38	114 30	-31	-34	0.54	0.69	80.	120.	160.	0.54
CORONATION	52 5	111 27	-31	-33	0.23	0.32	120.	200.	220.	0.98
COWLEY	49 34	114 5	-31	-34	0.73	0.91	80.	140.	180.	0.50
DRUMHELLER	51 28	112 42	-31	-33	0.32	0.39	160.	220.	280.	0.94
EDMONTON	53 33	113 28	-32	-34	0.32	0.40	100.	160.	180.	0.75
EDSON	53 35	116 26	-34	-37	0.36	0.43	60.	100.	120.	0.58
EMBARRAS PORTAGE	58 27	111 28	-41	-44	0.31	0.37	60.	80.	100.	0.57
FAIRVIEW	56 4	118 23	-38	-40	0.26	0.32	60.	100.	140.	0.73
FORT MCMURRAY	56 44	111 23	-39	-41	0.27	0.32	40.	60.	80.	0.54
FORT SASKATCHEWAN	53 43	113 13	-32	-35	0.31	0.39	80.	140.	160.	0.72
FORT VERMILION	58 24	116 0	-41	-43	0.22	0.26	40.	60.	80.	0.60
GRANDE PRAIRIE	55 10	118 48	-36	-39	0.37	0.44	80.	120.	140.	0.62
HABAY	58 50	118 44	-41	-43	0.20	0.24	40.	60.	80.	0.63
HARDISTY	52 40	111 18	-33	-35	0.24	0.32	100.	140.	180.	0.87
HIGH RIVER	50 35	113 52	-31	-33	0.51	0.60	140.	200.	220.	0.66
JASPER	52 53	118 5	-32	-35	0.37	0.43	60.	80.	100.	0.52
KEG RIVER	57 48	117 52	-40	-42	0.19	0.24	60.	80.	100.	0.73
LAC LA BICHE	54 46	111 58	-35	-38	0.31	0.37	60.	80.	100.	0.57
LACOMBE	52 28	113 44	-33	-35	0.24	0.31	120.	180.	200.	0.91
LETHBRIDGE	49 42	112 49	-30	-33	0.64	0.76	140.	200.	240.	0.61
MANNING	56 55	117 37	-39	-41	0.21	0.26	60.	80.	100.	0.69
MEDICINE HAT	50 3	110 40	-31	-34	0.39	0.49	180.	220.	240.	0.78
PEACE RIVER	56 14	117 17	-37	-40	0.24	0.29	60.	100.	120.	0.71
PINCHER CREEK	49 29	113 57	-32	-34	0.70	0.88	80.	140.	180.	0.51
RANFURLY	53 25	111 41	-34	-37	0.23	0.29	80.	100.	140.	0.78
RED DEER	52 16	113 48	-32	-35	0.31	0.37	140.	200.	260.	0.92
ROCKY MOUNTAIN HOUSE	52 22	114 55	-31	-33	0.26	0.32	80.	120.	140.	0.73
SLAVE LAKE	55 17	114 46	-36	-39	0.28	0.34	60.	80.	100.	0.60
STETTLER	52 19	112 43	-32	-34	0.24	0.32	140.	200.	220.	0.96
STONY PLAIN	53 32	114 0	-32	-35	0.32	0.40	80.	120.	160.	0.71
SUFFIELD	50 12	111 10	-32	-34	0.43	0.52	180.	220.	240.	0.75
TABER	49 47	112 8	-31	-33	0.57	0.69	160.	200.	240.	0.65
TURNER VALLEY	50 40	114 17	-31	-33	0.51	0.60	120.	180.	220.	0.66

PROVINCE AND LOCATION	LATITUDE				LONGITUDE				DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)			DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10	
	dd mm		ddd mm		JANUARY (C)		2.5% 1.0%		1/10		1/30		1/2		1/5		1/10		
VALLEYVIEW	55	4	117	17	-37	-40	0.35	0.43	60.	80.	120.							0.59	
VEGREVILLE	53	30	112	3	-34	-36	0.25	0.32	80.	100.	140.							0.75	
VERMILION	53	22	110	51	-35	-38	0.23	0.28	80.	100.	140.							0.78	
WAGNER	55	21	114	59	-36	-39	0.28	0.34	60.	80.	100.							0.60	
WAINWRIGHT	52	49	110	52	-33	-36	0.24	0.32	100.	120.	160.							0.82	
WETASKIWIN	52	58	113	22	-33	-35	0.24	0.32	120.	160.	180.							0.87	
WHITECOURT	54	9	115	41	-35	-38	0.32	0.39	60.	80.	100.							0.56	
WIMBORNE	51	52	113	35	-31	-34	0.30	0.37	120.	200.	240.							0.89	

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)	DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10		
			JANUARY (C)		1.0%		1/10	1/30	1/2			
			2.5%	1.0%								
SASKATCHEWAN:												
ASSINIBOIA	49 38	105 59	-32	-34	0.44	0.52	180.	240.	260.	0.77		
BATTRUM	50 33	108 20	-32	-34	0.49	0.60	180.	260.	260.	0.73		
BIGGAR	52 4	108 0	-34	-36	0.48	0.60	100.	180.	200.	0.65		
BROADVIEW	50 22	102 35	-34	-36	0.28	0.32	100.	160.	180.	0.80		
DAFOE	51 45	104 32	-36	-39	0.28	0.34	100.	140.	180.	0.80		
DUNDURN	51 49	106 30	-35	-37	0.39	0.48	120.	180.	200.	0.72		
ESTEVAN	49 8	102 59	-32	-34	0.42	0.51	140.	200.	240.	0.76		
HUDSON BAY	52 51	102 23	-37	-39	0.28	0.34	60.	80.	100.	0.60		
HUMBOLDT	52 12	105 7	-36	-39	0.29	0.36	100.	140.	180.	0.79		
ISLAND FALLS	55 32	102 21	-39	-41	0.45	0.56	60.	80.	120.	0.52		
KAMSACK	51 34	101 54	-35	-37	0.32	0.37	100.	120.	160.	0.71		
KINDERSLEY	51 28	109 10	-33	-35	0.45	0.58	140.	200.	220.	0.70		
LLOYDMINSTER	53 17	110 0	-35	-38	0.30	0.37	80.	120.	160.	0.73		
MAPLE CREEK	49 55	109 29	-31	-34	0.47	0.58	180.	220.	240.	0.71		
MEADOW LAKE	54 8	108 26	-36	-39	0.36	0.45	60.	120.	180.	0.71		
MELFORT	52 52	104 37	-37	-40	0.26	0.32	80.	120.	160.	0.78		
MELVILLE	50 55	102 48	-34	-36	0.32	0.37	100.	160.	180.	0.75		
MOOSE JAW	50 24	105 32	-32	-34	0.36	0.43	160.	200.	240.	0.82		
NIPAWIN	53 22	104 0	-38	-41	0.27	0.34	80.	100.	140.	0.72		
NORTH BATTLEFORD	52 47	108 17	-34	-36	0.45	0.62	100.	120.	160.	0.60		
PRINCE ALBERT	53 12	105 46	-37	-41	0.26	0.34	100.	140.	180.	0.83		
QU'APPELLE	50 33	103 53	-34	-36	0.34	0.39	120.	160.	200.	0.77		
REGINA	50 27	104 37	-34	-36	0.34	0.39	140.	200.	240.	0.84		
ROSETOWN	51 33	108 0	-33	-35	0.47	0.58	120.	200.	220.	0.68		
SASKATOON	52 7	106 38	-35	-37	0.36	0.44	120.	160.	200.	0.75		
SCOTT	52 22	108 50	-34	-36	0.44	0.58	100.	140.	200.	0.67		
STRASBOURG	51 4	104 57	-34	-36	0.33	0.39	120.	180.	220.	0.82		
SWIFT CURRENT	50 17	107 48	-32	-34	0.46	0.56	180.	240.	260.	0.75		
URANIUM CITY	59 34	108 36	-44	-46	0.37	0.45	60.	100.	120.	0.57		
WEYBURN	49 40	103 51	-33	-35	0.38	0.45	140.	200.	240.	0.79		
YORKTON	51 13	102 28	-34	-37	0.32	0.37	100.	140.	180.	0.75		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10	
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5			
			2.5%	1.0%								
MANITOBA:												
BEAUSEJOUR	50 4	96 31	-33	-35	0.31	0.37	120.	180.	220.	0.84		
BOISSEVAIN	49 14	100 3	-32	-34	0.44	0.52	120.	180.	220.	0.71		
BRANDON	49 50	99 57	-33	-35	0.37	0.45	120.	180.	220.	0.77		
CHURCHILL	58 45	94 7	-39	-41	0.48	0.59	180.	260.	350.	0.85		
DAUPHIN	51 9	100 3	-33	-35	0.31	0.37	120.	160.	180.	0.76		
FLIN FLON	54 46	101 53	-38	-40	0.42	0.52	60.	80.	100.	0.49		
GIMLI	50 38	97 0	-34	-36	0.30	0.37	120.	180.	220.	0.86		
ISLAND LAKE	53 52	94 40	-36	-38	0.37	0.43	60.	80.	100.	0.52		
LAC DU BONNET	50 14	96 4	-34	-36	0.28	0.34	120.	180.	200.	0.85		
LYNN LAKE	56 51	101 3	-40	-42	0.47	0.58	60.	100.	120.	0.51		
MORDEN	49 11	98 6	-31	-33	0.40	0.48	120.	180.	220.	0.74		
NEEPAWA	50 14	99 28	-32	-34	0.33	0.40	120.	180.	220.	0.82		
PINE FALLS	50 34	96 13	-34	-36	0.29	0.35	120.	180.	200.	0.83		
PORTAGE LA PRAIRIE	49 59	98 18	-31	-33	0.36	0.43	120.	180.	220.	0.78		
RIVERS	50 2	100 14	-34	-36	0.36	0.43	120.	180.	220.	0.78		
ST. BONIFACE	49 51	97 5	-33	-33	0.35	0.42	120.	180.	220.	0.79		
ST. VITAL	49 51	97 7	-33	-35	0.35	0.42	120.	180.	220.	0.79		
SANDILANDS	49 20	96 18	-32	-34	0.31	0.37	120.	180.	200.	0.80		
SELKIRK	50 9	96 52	-33	-35	0.33	0.39	120.	180.	220.	0.82		
SPLIT LAKE	56 15	96 6	-38	-40	0.51	0.60	80.	120.	160.	0.56		
STEINBACH	49 32	96 41	-33	-35	0.31	0.37	120.	180.	220.	0.84		
SWAN RIVER	52 7	101 16	-36	-38	0.30	0.35	80.	120.	160.	0.73		
THE PAS	53 50	101 15	-36	-38	0.35	0.43	80.	160.	200.	0.76		
THOMPSON	55 45	97 52	-42	-45	0.49	0.58	80.	100.	120.	0.49		
TRANScona	49 54	97 0	-33	-35	0.35	0.42	120.	180.	220.	0.79		
VIRDEN	49 51	100 56	-33	-35	0.36	0.43	120.	180.	220.	0.78		
WHITESHELL	49 54	95 12	-34	-36	0.28	0.34	100.	160.	180.	0.80		
WINNIPEG	49 53	97 9	-33	-35	0.35	0.42	120.	180.	220.	0.79		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C) 2.5%	1.0%	1/10	1/30	1/2	1/5	1/10		
ONTARIO:											
AILSA CRAIG	43 8	81 33	-17	-19	0.40	0.50	140.	180.	220.	0.74	
AJAX	43 51	79 2	-20	-22	0.43	0.52	120.	160.	180.	0.65	
ALEXANDRIA	45 19	74 38	-24	-26	0.30	0.37	120.	160.	180.	0.77	
ALLISTON	44 9	79 52	-23	-25	0.22	0.29	100.	120.	160.	0.85	
ALMONTE	45 14	76 12	-26	-28	0.30	0.37	120.	140.	180.	0.77	
ARMSTRONG	50 18	89 2	-39	-42	0.21	0.25	60.	100.	120.	0.76	
ARNPRIOR	45 26	76 21	-27	-29	0.27	0.34	100.	140.	180.	0.82	
ATIKOKAN	48 45	91 37	-34	-37	0.21	0.25	60.	100.	140.	0.82	
AURORA	44 0	79 28	-21	-23	0.30	0.39	100.	140.	180.	0.77	
BANCROFT	45 3	77 51	-27	-29	0.23	0.29	80.	100.	160.	0.83	
BARRIE	44 24	79 40	-24	-26	0.21	0.29	100.	120.	160.	0.87	
BARRIEFIELD	44 14	76 28	-22	-24	0.35	0.43	120.	160.	180.	0.72	
BEAVERTON	44 26	79 9	-24	-26	0.24	0.32	100.	120.	160.	0.82	
BELLEVILLE	44 10	77 23	-22	-24	0.32	0.39	140.	180.	200.	0.79	
BELMONT	42 53	81 5	-17	-19	0.35	0.45	140.	180.	220.	0.79	
BOWMANVILLE	43 55	78 41	-20	-22	0.46	0.55	120.	160.	180.	0.63	
BRACEBRIDGE	45 3	79 10	-26	-28	0.19	0.25	100.	120.	140.	0.86	
BRADFORD	44 7	79 34	-23	-25	0.24	0.32	100.	120.	160.	0.82	
BRAMPTON	43 41	79 46	-19	-21	0.32	0.39	120.	140.	180.	0.75	
BRANTFORD	43 8	80 16	-17	-19	0.31	0.37	120.	160.	180.	0.76	
BRIGHTON	44 2	77 44	-21	-23	0.42	0.50	120.	160.	180.	0.65	
BROCKVILLE	44 35	75 41	-23	-25	0.32	0.39	140.	180.	200.	0.79	
BROOKLIN	43 57	78 57	-20	-22	0.38	0.48	100.	140.	160.	0.65	
BURKS FALLS	45 37	79 24	-26	-28	0.20	0.26	100.	120.	140.	0.84	
BURLINGTON	43 19	79 47	-17	-19	0.36	0.43	120.	160.	180.	0.71	
CALEDONIA	43 4	79 56	-17	-19	0.31	0.37	120.	160.	200.	0.80	
CAMBRIDGE	43 23	80 19	-18	-20	0.26	0.32	120.	160.	200.	0.88	
CAMPBELLFORD	44 18	77 48	-23	-26	0.29	0.37	120.	160.	180.	0.79	
CAMP BORDEN	44 16	79 53	-23	-25	0.21	0.29	100.	120.	160.	0.87	
CANNINGTON	44 21	79 2	-24	-26	0.24	0.32	100.	120.	160.	0.82	
CARLETON PLACE	45 8	76 9	-25	-27	0.30	0.37	120.	160.	180.	0.77	
CAVAN	44 12	78 28	-22	-25	0.31	0.39	100.	140.	160.	0.72	
CENTRALIA	43 17	81 28	-17	-19	0.37	0.48	140.	180.	220.	0.77	
CHAPLEAU	47 50	83 24	-35	-38	0.19	0.25	60.	80.	100.	0.73	
CHATHAM	42 24	82 11	-16	-18	0.32	0.39	140.	180.	220.	0.83	
CHELMSFORD	46 35	81 12	-28	-30	0.29	0.39	120.	180.	220.	0.87	
CHESLEY	44 17	81 5	-19	-21	0.33	0.43	120.	140.	200.	0.78	
CLINTON	43 37	81 32	-17	-19	0.37	0.48	120.	160.	200.	0.74	
COBOCONK	44 39	78 48	-25	-27	0.22	0.29	100.	120.	160.	0.85	
COBOURG	43 58	78 10	-21	-23	0.46	0.55	120.	160.	180.	0.63	
COCHRANE	49 4	81 1	-34	-36	0.26	0.32	60.	80.	100.	0.62	
COLBORNE	44 0	77 53	-21	-23	0.44	0.52	120.	160.	200.	0.67	
COLLINGWOOD	44 29	80 13	-22	-24	0.25	0.34	120.	160.	200.	0.89	
CORNWALL	45 2	74 44	-23	-25	0.30	0.37	140.	180.	200.	0.82	

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)			DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5	1/10		
			2.5%	1.0%								
CORUNNA	42 53	82 26	-16	-18	0.35	0.43	140.	180.	220.		0.79	
DEEP RIVER	46 6	77 30	-29	-32	0.20	0.24	80.	100.	160.		0.89	
DESERONTO	44 12	77 3	-22	-24	0.32	0.39	140.	160.	200.		0.79	
DORCHESTER	42 59	81 4	-18	-20	0.33	0.43	140.	180.	220.		0.82	
DORION	48 47	88 32	-33	-35	0.25	0.29	100.	160.	180.		0.85	
DRESDEN	42 35	82 11	-16	-18	0.32	0.39	140.	180.	220.		0.83	
DRYDEN	49 47	92 50	-34	-36	0.21	0.25	80.	120.	140.		0.82	
DUNBARTON	43 49	79 6	-19	-21	0.43	0.52	100.	140.	180.		0.65	
DUNNVILLE	42 54	79 36	-15	-17	0.33	0.39	120.	160.	200.		0.78	
DURHAM	44 10	80 49	-20	-22	0.31	0.39	120.	140.	180.		0.76	
DUTTON	42 39	81 30	-16	-18	0.34	0.43	140.	180.	220.		0.80	
EARLTON	47 43	79 49	-33	-36	0.32	0.40	80.	120.	140.		0.66	
EDISON	49 48	93 33	-34	-36	0.20	0.24	80.	120.	140.		0.84	
ELMVALE	44 35	79 52	-24	-26	0.24	0.32	120.	140.	160.		0.82	
EMBRO	43 9	80 54	-18	-20	0.33	0.43	140.	160.	180.		0.74	
ENGLEHART	47 49	79 52	-33	-36	0.29	0.37	80.	100.	140.		0.69	
ESPAÑOLA	46 15	81 46	-25	-27	0.28	0.37	120.	160.	200.		0.85	
EXETER	43 21	81 29	-17	-19	0.37	0.48	140.	180.	220.		0.77	
FENELON FALLS	44 32	78 45	-25	-27	0.25	0.32	100.	120.	180.		0.85	
FERGUS	43 42	80 22	-20	-22	0.26	0.32	120.	160.	180.		0.83	
FONTHILL	43 2	79 17	-15	-17	0.33	0.39	120.	160.	180.		0.74	
FOREST	43 6	82 0	-16	-18	0.39	0.48	120.	160.	220.		0.75	
FORT ERIE	42 54	78 56	-15	-17	0.36	0.43	120.	160.	180.		0.71	
FORT FRANCES	48 36	93 24	-33	-35	0.21	0.25	80.	120.	140.		0.82	
GANANOQUE	44 20	76 10	-22	-24	0.35	0.43	140.	180.	200.		0.76	
GEORGETOWN	43 39	79 55	-19	-21	0.27	0.34	100.	140.	180.		0.82	
GERALDTON	49 44	86 57	-35	-38	0.20	0.24	80.	100.	120.		0.77	
GLENCOE	42 45	81 43	-16	-18	0.31	0.39	140.	180.	220.		0.84	
GODERICH	43 45	81 43	-16	-18	0.40	0.50	140.	180.	220.		0.74	
GORE BAY	45 55	82 28	-23	-25	0.30	0.36	120.	160.	200.		0.82	
GRAHAM	49 15	90 34	-37	-40	0.21	0.25	80.	140.	160.		0.87	
GRAVENHURST	44 55	79 22	-26	-28	0.19	0.25	100.	120.	140.		0.86	
GRIMSBY	43 12	79 34	-16	-18	0.36	0.43	120.	160.	180.		0.71	
GUELPH	43 33	80 15	-19	-21	0.25	0.30	120.	140.	180.		0.85	
GUTHRIE	44 28	79 33	-24	-26	0.21	0.29	100.	120.	160.		0.87	
HAGERSVILLE	42 58	80 3	-16	-18	0.33	0.39	120.	160.	180.		0.74	
HAILEYBURY	47 27	79 38	-32	-35	0.32	0.39	80.	120.	140.		0.66	
HALIBURTON	45 3	78 31	-27	-29	0.19	0.25	80.	100.	140.		0.86	
HAMILTON	43 15	79 51	-17	-19	0.36	0.43	120.	160.	180.		0.71	
HANOVER	44 9	81 2	-19	-21	0.34	0.43	120.	140.	200.		0.77	
HASTINGS	44 18	77 57	-23	-26	0.29	0.37	120.	140.	180.		0.79	
HAWKESBURY	45 36	74 37	-25	-27	0.31	0.37	120.	160.	200.		0.80	
HEARST	49 41	83 40	-34	-36	0.20	0.25	60.	80.	120.		0.77	
HONEY HARBOUR	44 52	79 49	-24	-26	0.25	0.34	120.	160.	200.		0.89	
HORNEPAYNE	49 13	84 47	-37	-40	0.19	0.25	60.	80.	120.		0.79	

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5	1/10	
	dd	mm	ddd	mm							
HUNTSVILLE	45 20	79 13	-26	-29	0.19	0.25	100.	120.	140.	0.86	
INGERSOLL	43 2	80 53	-18	-20	0.33	0.43	140.	180.	220.	0.82	
JARVIS	42 53	80 6	-16	-18	0.33	0.39	120.	160.	200.	0.78	
JELLICOE	49 41	87 31	-36	-39	0.21	0.25	80.	100.	120.	0.76	
KAPUSKASING	49 25	82 26	-33	-35	0.23	0.28	60.	100.	120.	0.72	
KEMPTVILLE	45 1	75 38	-25	-27	0.30	0.37	120.	160.	200.	0.82	
KENORA	49 47	94 29	-33	-36	0.20	0.24	80.	120.	140.	0.84	
KILLALOE	45 32	77 25	-28	-31	0.24	0.29	100.	120.	160.	0.82	
KINCARDINE	44 11	81 38	-17	-19	0.40	0.50	120.	180.	220.	0.74	
KINGSTON	44 14	76 30	-22	-24	0.35	0.43	140.	180.	200.	0.76	
KINMOUNT	44 47	78 39	-26	-28	0.20	0.26	100.	120.	160.	0.89	
KIRKLAND LAKE	48 9	80 2	-33	-36	0.29	0.37	80.	100.	120.	0.64	
KITCHENER	43 27	80 29	-19	-21	0.27	0.34	120.	140.	180.	0.82	
LAKEFIELD	44 26	78 16	-24	-26	0.27	0.34	100.	140.	180.	0.82	
LANSDOWNE HOUSE	52 14	87 53	-39	-41	0.24	0.29	100.	140.	160.	0.82	
LEAMINGTON	42 3	82 36	-15	-17	0.35	0.43	140.	180.	220.	0.79	
LINDSAY	44 21	78 44	-24	-26	0.26	0.34	100.	140.	180.	0.83	
LION'S HEAD	44 59	81 15	-19	-21	0.33	0.43	120.	180.	200.	0.78	
LISTOWEL	43 44	80 57	-19	-21	0.34	0.43	120.	160.	200.	0.77	
LONDON	42 59	81 14	-18	-20	0.36	0.48	140.	180.	220.	0.78	
LUCAN	43 11	81 24	-17	-19	0.39	0.50	140.	180.	220.	0.75	
MAITLAND	44 38	75 37	-23	-25	0.32	0.39	140.	180.	200.	0.79	
MARKDALE	44 19	80 39	-20	-22	0.29	0.37	120.	160.	180.	0.79	
MARTIN	49 15	91 8	-36	-39	0.21	0.25	80.	120.	160.	0.87	
MATHESON	48 32	80 28	-33	-36	0.30	0.37	80.	100.	120.	0.63	
MATTAWA	46 19	78 42	-29	-31	0.24	0.29	80.	100.	140.	0.76	
MIDLAND	44 45	79 53	-23	-26	0.25	0.34	100.	160.	200.	0.89	
MILTON	43 31	79 53	-18	-20	0.32	0.39	120.	160.	180.	0.75	
MILVERTON	43 34	80 55	-19	-21	0.31	0.39	120.	160.	200.	0.80	
MINDEN	44 55	78 53	-29	-29	0.19	0.25	80.	100.	160.	0.92	
MISSISSAUGA	43 35	79 39	-18	-20	0.37	0.45	120.	160.	180.	0.70	
MITCHELL	43 28	81 12	-18	-20	0.35	0.45	140.	160.	200.	0.76	
MOOSONEE	51 17	80 39	-36	-38	0.19	0.24	100.	160.	180.	0.97	
MORRISBURG	44 54	75 11	-23	-25	0.30	0.37	140.	180.	200.	0.82	
MOUNT FOREST	43 59	80 44	-21	-23	0.29	0.37	120.	140.	200.	0.83	
MUSKOKA AIRPORT	44 58	79 18	-26	-28	0.19	0.25	100.	120.	140.	0.86	
NAKINA	50 10	86 42	-35	-37	0.20	0.24	60.	100.	140.	0.84	
NAPANEE	44 15	76 57	-22	-24	0.32	0.39	140.	160.	200.	0.79	
NEWCASTLE	43 55	78 35	-20	-22	0.46	0.55	120.	160.	180.	0.63	
NEW LISKEARD	47 30	79 40	-32	-35	0.31	0.39	80.	100.	140.	0.67	
NEWMARKET	44 3	79 28	-22	-24	0.26	0.34	100.	140.	180.	0.83	
NIAGARA FALLS	43 6	79 4	-16	-18	0.33	0.39	120.	160.	180.	0.74	
NORTH BAY	46 19	79 28	-28	-30	0.26	0.31	100.	120.	160.	0.78	
NORWOOD	44 23	77 59	-24	-26	0.29	0.37	100.	120.	160.	0.74	
OAKVILLE	43 27	79 41	-18	-20	0.37	0.45	120.	160.	180.	0.70	

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/1.0	
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5			
			2.5%	1.0%								
ORANGEVILLE	43 55	80 6	-21	-23	0.25	0.32	100.	140.	160.	0.80		
ORILLIA	44 37	79 25	-25	-27	0.19	0.26	100.	120.	160.	0.92		
OSHAWA	43 54	78 51	-19	-21	0.43	0.52	120.	160.	180.	0.65		
OTTAWA	45 25	75 42	-25	-27	0.30	0.37	120.	160.	180.	0.77		
OWEN SOUND	44 34	80 56	-19	-21	0.33	0.43	120.	160.	200.	0.78		
PAGWA RIVER	50 1	85 13	-34	-36	0.19	0.25	60.	80.	120.	0.79		
PARIS	43 12	80 23	-17	-19	0.31	0.37	120.	160.	180.	0.76		
PARKHILL	43 9	81 41	-16	-18	0.40	0.50	140.	180.	200.	0.71		
PARRY SOUND	45 21	80 2	-24	-26	0.24	0.34	100.	160.	200.	0.91		
PEMBROKE	45 49	77 7	-28	-31	0.22	0.26	80.	100.	160.	0.85		
PENETANGUISHENE	44 47	79 55	-23	-26	0.25	0.34	100.	160.	200.	0.89		
PERTH	44 54	76 15	-25	-27	0.29	0.37	100.	140.	180.	0.79		
PETAWAHA	45 54	77 17	-29	-31	0.19	0.24	80.	100.	160.	0.92		
PETERBOROUGH	44 18	78 19	-23	-25	0.29	0.37	100.	140.	180.	0.79		
PETROLIA	42 52	82 9	-16	-18	0.35	0.43	140.	180.	220.	0.79		
PICTON	44 0	77 8	-21	-23	0.37	0.45	120.	160.	180.	0.70		
PLATTSVILLE	43 18	80 37	-18	-20	0.30	0.37	100.	140.	180.	0.77		
POINT ALEXANDER	46 8	77 34	-29	-32	0.20	0.24	80.	100.	140.	0.84		
PORCUPINE	48 30	81 10	-34	-36	0.27	0.34	60.	100.	120.	0.67		
PORT BURWELL	42 39	80 49	-15	-17	0.34	0.43	120.	180.	180.	0.73		
PORT COLBORNE	42 54	79 14	-15	-17	0.37	0.43	120.	160.	180.	0.70		
PORT CREDIT	43 33	79 35	-18	-20	0.37	0.45	120.	160.	180.	0.70		
PORT DOVER	42 47	80 12	-15	-17	0.36	0.43	120.	140.	180.	0.71		
PORT ELGIN	44 26	81 24	-17	-19	0.40	0.50	140.	180.	200.	0.71		
PORT HOPE	43 57	78 18	-21	-23	0.46	0.55	140.	180.	200.	0.66		
PORT PERRY	44 6	78 57	-22	-24	0.31	0.39	100.	140.	180.	0.76		
PORT STANLEY	42 40	81 13	-15	-17	0.34	0.43	140.	180.	200.	0.77		
PRESCOTT	44 43	75 31	-23	-25	0.32	0.39	140.	180.	200.	0.79		
PRINCETON	43 10	80 32	-17	-19	0.30	0.37	120.	160.	200.	0.82		
RAITH	48 50	89 56	-35	-37	0.21	0.25	80.	120.	160.	0.87		
RED LAKE	51 3	93 49	-34	-36	0.22	0.26	80.	120.	140.	0.80		
RENFREW	45 28	76 41	-27	-30	0.26	0.32	100.	140.	160.	0.78		
RIDGEWAY	42 53	79 3	-15	-17	0.37	0.43	120.	160.	180.	0.70		
ROCKLAND	45 33	75 18	-26	-28	0.30	0.37	120.	160.	180.	0.77		
ST. CATHARINES	43 10	79 15	-16	-18	0.36	0.43	120.	160.	180.	0.71		
ST. MARY'S	43 15	81 8	-18	-20	0.35	0.45	120.	160.	200.	0.76		
ST. THOMAS	42 47	81 12	-16	-18	0.33	0.43	140.	180.	200.	0.78		
SARNIA	42 58	82 23	-16	-18	0.35	0.43	140.	180.	220.	0.79		
SAULT STE MARIE	46 31	84 20	-25	-28	0.32	0.37	140.	200.	240.	0.87		
SCHREIBER	48 48	87 15	-35	-38	0.25	0.29	100.	160.	180.	0.85		
SEAFORTH	43 33	81 24	-17	-19	0.37	0.48	120.	160.	180.	0.70		
SIMCOE	42 50	80 18	-17	-19	0.33	0.39	120.	160.	180.	0.74		
SIOUX LOOKOUT	50 6	91 55	-34	-36	0.21	0.25	60.	100.	120.	0.76		
SMITHS FALLS	44 54	76 1	-25	-27	0.29	0.37	100.	140.	180.	0.79		
SMITHVILLE	43 6	79 33	-16	-18	0.33	0.39	120.	160.	180.	0.74		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C)			1/10	1/30	1/2	1/5	1/10	
			2.5%	1.0%							
SMOOTH ROCK FALLS	49 17	81 38	-34	-36	0.24	0.29	60.	80.	120.	0.71	
SOUTHAMPTON	44 29	81 23	-17	-19	0.38	0.48	140.	180.	220.	0.76	
SOUTH PORCUPINE	48 28	81 13	-34	-36	0.27	0.34	60.	100.	140.	0.72	
SOUTH RIVER	45 50	79 23	-27	-29	0.33	0.29	100.	120.	140.	0.65	
STIRLING	44 18	77 33	-23	-25	0.28	0.36	100.	120.	160.	0.76	
STRATFORD	43 22	80 57	-18	-20	0.33	0.43	120.	160.	200.	0.78	
STRATHROY	42 57	81 38	-17	-19	0.36	0.45	140.	180.	220.	0.78	
STREETSVILLE	43 35	79 42	-18	-20	0.35	0.43	120.	160.	180.	0.72	
STURGEON FALLS	46 22	79 55	-27	-29	0.25	0.32	100.	140.	180.	0.85	
SUDSBURY	46 30	81 0	-28	-30	0.29	0.40	160.	200.	240.	0.91	
SUNDRIDGE	45 46	79 24	-27	-29	0.23	0.29	100.	120.	140.	0.78	
TAVISTOCK	43 19	80 50	-18	-20	0.34	0.43	120.	160.	200.	0.77	
TEMAGAMI	47 4	79 47	-30	-33	0.27	0.34	80.	120.	140.	0.72	
THAMESFORD	43 4	81 0	-18	-20	0.33	0.43	140.	160.	220.	0.82	
THEDFORD	43 9	81 51	-16	-18	0.41	0.50	140.	180.	220.	0.73	
THUNDER BAY	48 24	89 19	-31	-33	0.25	0.29	100.	160.	200.	0.89	
TILLSONBURG	42 51	80 44	-17	-19	0.31	0.39	140.	160.	200.	0.80	
TIMMINS	48 28	81 20	-34	-36	0.25	0.32	60.	100.	140.	0.75	
TORONTO	43 40	79 23	-18	-20	0.39	0.48	120.	160.	180.	0.68	
TRENTON	44 6	77 35	-21	-23	0.35	0.43	140.	160.	200.	0.76	
TROUT CREEK	45 59	79 22	-27	-29	0.24	0.29	100.	120.	140.	0.76	
UXBRIDGE	44 6	79 7	-22	-24	0.29	0.37	100.	140.	160.	0.74	
VANIER	45 26	75 40	-25	-27	0.30	0.37	120.	160.	180.	0.77	
VITTORIA	42 46	80 19	-15	-17	0.35	0.43	120.	160.	200.	0.76	
WALKERTON	44 7	81 9	-18	-20	0.35	0.45	120.	160.	200.	0.76	
WALLACEBURG	42 36	82 23	-16	-18	0.32	0.39	140.	180.	220.	0.83	
WATERLOO	43 28	80 31	-19	-21	0.27	0.34	120.	160.	180.	0.82	
WATFORD	42 57	81 53	-16	-18	0.34	0.43	140.	160.	220.	0.80	
WAWA	47 59	84 47	-35	-38	0.24	0.28	100.	160.	180.	0.87	
WELLAND	42 59	79 15	-15	-17	0.33	0.39	120.	160.	180.	0.74	
WEST LORNE	42 36	81 36	-16	-18	0.34	0.43	140.	180.	220.	0.80	
WHITBY	43 52	78 56	-20	-22	0.43	0.52	120.	160.	180.	0.65	
WHITE RIVER	48 36	85 17	-39	-42	0.20	0.24	60.	100.	120.	0.77	
WIARTON	44 45	81 9	-18	-20	0.33	0.43	120.	180.	200.	0.78	
WINDSOR	42 18	83 1	-16	-18	0.29	0.36	140.	180.	220.	0.87	
WINGHAM	43 53	81 19	-18	-20	0.35	0.45	120.	160.	200.	0.76	
WOODSTOCK	43 8	80 45	-18	-20	0.31	0.39	120.	160.	200.	0.80	
WYOMING	42 57	82 7	-16	-18	0.35	0.43	140.	180.	220.	0.79	

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10	
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5			
			2.5%	1.0%								
QUEBEC:												
ACTON-VALE	45 39	72 34	-24	-27	0.24	0.29	140.	180.	200.	0.91		
ALMA	48 33	71 39	-30	-32	0.23	0.29	120.	160.	180.	0.88		
AMOS	48 35	78 7	-34	-36	0.24	0.29	80.	100.	120.	0.71		
ANCIENNE-LORETTE	46 48	71 21	-25	-28	0.38	0.48	140.	200.	240.	0.79		
ASBESTOS	45 46	71 56	-26	-28	0.26	0.32	120.	160.	180.	0.83		
AYLMER	45 26	75 50	-25	-28	0.30	0.37	120.	160.	180.	0.77		
BAGOTVILLE	48 21	70 53	-31	-33	0.27	0.34	120.	160.	200.	0.86		
BATE-COMEAU	49 13	68 9	-27	-29	0.55	0.69	180.	220.	260.	0.69		
BEACONSFIELD	45 26	73 52	-23	-26	0.31	0.37	140.	180.	200.	0.80		
BEAUPORT	46 52	71 11	-25	-28	0.38	0.48	140.	200.	240.	0.79		
BEDFORD	45 7	72 59	-23	-25	0.31	0.37	140.	160..	200.	0.80		
BELOEIL	45 34	73 12	-24	-26	0.28	0.34	140.	180.	200.	0.85		
BROSSARD	45 27	73 28	-24	-26	0.31	0.37	140.	180.	200.	0.80		
BUCKINGHAM	45 35	75 25	-26	-28	0.30	0.37	120.	160.	180.	0.77		
CAMPBELL'S BAY	45 44	76 36	-28	-30	0.24	0.29	100.	140.	160.	0.82		
CHICOUTIMI	48 26	71 4	-30	-32	0.25	0.32	120.	140.	200.	0.89		
COATICOOK	45 8	71 48	-24	-26	0.27	0.34	120.	160.	200.	0.86		
CONTRECOEUR	45 51	73 14	-24	-27	0.27	0.32	120.	180.	200.	0.86		
COWANSVILLE	45 12	72 45	-24	-26	0.31	0.37	140.	160.	200.	0.80		
DOLBEAU	48 53	72 14	-31	-33	0.22	0.26	100.	140.	160.	0.85		
DORVAL	45 27	73 45	-23	-26	0.31	0.37	140.	180.	200.	0.80		
DRUMMONDVILLE	45 53	72 29	-25	-28	0.24	0.29	140.	180.	200.	0.91		
FARNHAM	45 17	72 59	-24	-26	0.31	0.37	140.	180.	200.	0.80		
FORT-COULONGE	45 51	76 44	-28	-30	0.37	0.29	80.	100.	140.	0.62		
GAGNON	51 53	68 10	-33	-35	0.37	0.43	100.	140.	180.	0.70		
GASPE	48 50	64 29	-23	-25	0.81	0.98	200.	300.	350.	0.66		
GATINEAU	45 30	75 39	-25	-28	0.30	0.37	120.	160.	180.	0.77		
GENTILLY	46 24	72 17	-25	-28	0.23	0.28	120.	160.	200.	0.93		
GRACEFIELD	46 6	76 3	-28	-31	0.24	0.29	100.	140.	180.	0.87		
GRANBY	45 24	72 44	-25	-27	0.26	0.32	140.	160.	200.	0.88		
HARRINGTON-HARBOUR	50 30	59 29	-25	-27	0.72	0.94	220.	300.	350.	0.70		
HAVRE-ST-PIERRE	50 14	63 36	-27	-29	0.75	0.93	220.	300.	350.	0.68		
HEMMINGFORD	45 3	73 35	-23	-25	0.30	0.37	120.	160.	200.	0.82		
HULL	45 26	75 44	-25	-28	0.30	0.37	120.	160.	180.	0.77		
IBERVILLE	45 18	73 14	-24	-26	0.31	0.37	140.	160.	200.	0.80		
INUKJUAK	58 27	78 6	-38	-40	0.63	0.81	180.	240.	350.	0.75		
JOLIETTE	46 1	73 27	-25	-28	0.25	0.30	120.	160.	200.	0.89		
JONQUIERE	48 25	71 13	-29	-31	0.25	0.32	120.	160.	200.	0.89		
KENOOGAMI	48 25	71 15	-29	-31	0.25	0.32	120.	160.	200.	0.89		
KOVIK-BAY	61 33	77 40	-38	-40	0.67	0.84	180.	240.	300.	0.67		
KUUJJUAQ	58 6	68 25	-39	-40	0.53	0.66	160.	260.	350.	0.81		
KUUJJUARAPIK	55 17	77 45	-36	-38	0.64	0.76	140.	180.	220.	0.59		
LACHINE	45 26	73 41	-23	-26	0.31	0.37	120.	160.	200.	0.80		
LACHUTE	45 39	74 20	-25	-27	0.31	0.37	120.	160.	200.	0.80		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10	
			JANUARY (C)		2.5% 1.0%	1/10	1/30	1/2	1/5			
			2.5%	1.0%								
LA-MALBAIE	47 39	70 9	-26	-28	0.39	0.50	140.	180.	200.	0.72		
LA-SALLE	45 26	73 38	-23	-26	0.31	0.37	140.	180.	200.	0.80		
LA-TUQUE	47 26	72 47	-29	-31	0.20	0.24	120.	160.	200.	1.00		
LAVAL	45 35	73 45	-24	-26	0.32	0.37	120.	160.	200.	0.79		
LENNOXVILLE	45 22	71 51	-28	-30	0.23	0.29	120.	160.	200.	0.93		
LERY	45 21	73 48	-23	-26	0.31	0.37	140.	180.	200.	0.80		
LEVIS	46 48	71 11	-25	-28	0.38	0.48	120.	160.	200.	0.73		
LORETTEVILLE	46 51	71 21	-25	-28	0.38	0.48	140.	200.	200.	0.73		
LOUISEVILLE	46 15	72 57	-25	-28	0.22	0.26	120.	160.	200.	0.95		
MAGOG	45 16	72 8	-26	-28	0.26	0.32	120.	160.	200.	0.88		
MALARTIC	48 8	78 8	-33	-36	0.24	0.29	80.	100.	120.	0.71		
MANIWAKI	46 23	75 58	-29	-32	0.24	0.28	80.	100.	160.	0.82		
MASSON	45 32	75 25	-26	-28	0.30	0.37	120.	160.	200.	0.82		
MATANE	48 51	67 32	-24	-26	0.53	0.69	80.	220.	260.	0.70		
MEGANTIC	45 35	70 53	-27	-29	0.45	0.58	120.	160.	200.	0.67		
MONT-JOLI	48 35	68 11	-24	-26	0.54	0.70	160.	220.	260.	0.69		
MONT-LAURIER	46 33	75 30	-29	-32	0.24	0.28	120.	160.	180.	0.87		
MONTMAGNY	46 59	70 33	-25	-28	0.39	0.50	120.	180.	200.	0.72		
MONTREAL	45 30	73 36	-23	-26	0.31	0.37	140.	180.	200.	0.80		
MONTREAL-NORD	45 36	73 38	-23	-26	0.31	0.37	140.	160.	200.	0.80		
MONT-ROYAL	45 31	73 39	-23	-26	0.31	0.37	140.	180.	200.	0.80		
NITCHEQUON	53 12	70 54	-38	-40	0.29	0.34	100.	140.	180.	0.79		
NORANDA	48 15	79 2	-33	-36	0.26	0.32	80.	100.	120.	0.68		
OUTREMONT	45 31	73 37	-23	-26	0.31	0.37	140.	180.	200.	0.80		
PERCE	48 32	64 13	-22	-25	0.82	0.98	220.	300.	350.	0.65		
PIERREFONDS	45 29	73 52	-23	-26	0.31	0.37	140.	180.	200.	0.80		
PINCOURT	45 23	73 59	-23	-26	0.31	0.37	140.	180.	200.	0.80		
PLESSISVILLE	46 13	71 47	-26	-28	0.26	0.32	140.	180.	200.	0.88		
POINTE-CLAIRES	45 26	73 50	-23	-26	0.31	0.37	140.	180.	200.	0.80		
PORT-CARTIER	50 1	66 53	-29	-32	0.67	0.83	220.	300.	350.	0.72		
QUEBEC	46 46	71 14	-25	-28	0.38	0.48	140.	200.	240.	0.79		
RICHMOND	45 40	71 9	-25	-27	0.24	0.29	120.	160.	200.	0.91		
RIMOUSKI	48 26	68 33	-25	-27	0.48	0.60	160.	200.	240.	0.71		
RIVIERE-DU-LOUP	47 50	69 32	-25	-27	0.41	0.52	140.	180.	220.	0.73		
ROBERVAL	48 31	72 13	-30	-33	0.22	0.26	100.	140.	180.	0.90		
ROCK-ISLAND	45 1	72 6	-24	-26	0.30	0.37	140.	160.	200.	0.82		
ROSEMERE	45 38	73 48	-24	-26	0.32	0.37	140.	160.	200.	0.79		
ROUYN	48 14	79 1	-33	-36	0.26	0.32	80.	100.	120.	0.68		
STE-AGATHE-DES-MONTS	46 3	74 17	-27	-29	0.27	0.32	120.	140.	180.	0.82		
STE-ANNE-DE-BELLEVUE	45 25	73 56	-23	-26	0.31	0.37	140.	180.	200.	0.80		
ST-FELICIEN	48 39	72 27	-31	-27	0.22	0.26	100.	140.	180.	0.90		
ST-FOY	46 47	71 17	-25	-28	0.38	0.48	140.	180.	220.	0.76		
ST-HUBERT	45 30	73 25	-24	-26	0.31	0.37	140.	180.	200.	0.80		
ST-HUBERT-DE-TEMISCOUATA	47 49	69 9	-26	-28	0.41	0.52	140.	180.	220.	0.73		
ST-HYACINTHE	45 37	72 57	-24	-27	0.27	0.32	120.	160.	200.	0.86		

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C) 2.5%	1.0%	1/10	1/30	1/2	1/5	1/10	
ST-JEAN	45 19	73 16	-24	-26	0.31	0.37	140.	180.	200.	0.80
ST-JEROME	45 47	74 0	-25	-27	0.29	0.34	120.	160.	180.	0.79
ST-JOVITE	46 7	74 36	-27	-30	0.25	0.30	120.	160.	180.	0.85
ST-LAMBERT	45 30	73 30	-23	-26	0.31	0.37	120.	160.	200.	0.80
ST-LAURENT	45 30	73 40	-23	-26	0.31	0.37	120.	160.	200.	0.80
ST-NICOLAS	46 42	71 24	-25	-28	0.37	0.45	140.	200.	220.	0.77
SCHEFFERVILLE	54 48	66 50	-38	-40	0.33	0.39	100.	180.	220.	0.82
SENNETERRE	48 23	77 14	-34	-36	0.24	0.29	80.	100.	120.	0.71
SEPT-ILES	50 12	66 23	-30	-42	0.69	0.84	220.	300.	350.	0.71
SHAWINIGAN	46 33	72 45	-26	-29	0.19	0.24	140.	180.	200.	1.03
SHAWVILLE	45 36	76 29	-27	-30	0.26	0.32	120.	160.	180.	0.83
SHERBROOKE	45 25	71 54	-28	-30	0.21	0.26	120.	160.	200.	0.98
SILLERY	46 46	71 15	-25	-28	0.38	0.48	140.	200.	220.	0.76
SOREL	46 2	73 7	-24	-27	0.24	0.29	140.	180.	200.	0.91
SUTTON	45 6	72 37	-24	-26	0.31	0.37	140.	160.	200.	0.80
TADOUSSAC	48 9	69 43	-26	-28	0.40	0.51	140.	180.	220.	0.74
TEMISCAMING	46 43	79 6	-30	-32	0.24	0.29	80.	100.	140.	0.76
THETFORD-MINES	46 5	71 18	-26	-28	0.36	0.45	120.	160.	200.	0.75
THURSO	45 36	75 15	-26	-28	0.30	0.37	120.	160.	200.	0.82
TROIS-RIVIERE	46 21	72 33	-25	-28	0.22	0.26	140.	180.	200.	0.95
VAL-D'OR	48 6	77 47	-33	-36	0.24	0.29	80.	100.	120.	0.71
VARENNES	45 41	73 26	-24	-26	0.28	0.34	120.	160.	200.	0.85
VERCHERES	45 47	73 21	-23	-26	0.27	0.32	120.	160.	200.	0.86
VERDUN	45 27	73 34	-23	-26	0.31	0.37	140.	180.	200.	0.80
VICTORIAVILLE	46 3	71 58	-26	-28	0.26	0.32	140.	180.	200.	0.88
VILLE-MARIE	47 20	79 26	-31	-34	0.30	0.37	100.	120.	140.	0.68
WATERLOO	45 21	72 31	-24	-27	0.26	0.32	120.	160.	200.	0.88
WESTMOUNT	45 29	73 36	-23	-26	0.31	0.37	120.	160.	200.	0.80
WINDSOR	45 34	72 0	-25	-27	0.23	0.29	120.	160.	200.	0.93

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C) 2.5%	1.0%	1/10	1/30	1/2	1/5	1/10		
NEW BRUNSWICK:											
ALMA	45 36	64 57	-21	-23	0.38	0.50	200.	260.	300.	0.89	
BATHURST	47 36	65 39	-23	-26	0.34	0.43	140.	180.	220.	0.80	
CAMPBELLTON	48 0	66 40	-26	-28	0.37	0.48	140.	180.	200.	0.74	
CHATHAM	47 2	65 28	-24	-26	0.29	0.37	160.	200.	220.	0.87	
EDMUNDSTON	47 22	68 20	-27	-29	0.30	0.39	120.	160.	180.	0.77	
FREDERICTON	45 58	66 39	-24	-27	0.30	0.37	120.	160.	200.	0.82	
GAGETOWN	45 46	66 9	-23	-26	0.36	0.48	140.	180.	220.	0.78	
GRAND FALLS	47 3	67 44	-27	-30	0.29	0.37	120.	160.	180.	0.79	
MONCTON	46 6	64 47	-22	-24	0.46	0.58	160.	220.	260.	0.75	
OROMOCTO	45 51	66 29	-23	-26	0.35	0.45	120.	160.	200.	0.76	
SACKVILLE	45 54	64 22	-21	-23	0.41	0.52	180.	220.	260.	0.80	
SAINT JOHN	45 16	66 3	-22	-24	0.38	0.48	200.	260.	300.	0.89	
ST STEPHEN	45 12	67 17	-22	-25	0.45	0.55	140.	180.	220.	0.70	
SHIPPEGAN	47 44	64 42	-22	-24	0.52	0.63	200.	260.	280.	0.73	
WOODSTOCK	46 9	67 35	-26	-29	0.27	0.34	120.	160.	180.	0.82	

PROVINCE AND LOCATION	LATITUDE		LONGITUDE		DESIGN TEMPERATURE			HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
	dd mm		ddd mm		JANUARY (C)		2.5%	1.0%	1/10	1/30	1/2	1/5	1/10
NOVA SCOTIA:													
AMHERST	45	50	64	12	-21	-24	0.41	0.52	180.	220.	260.		0.80
ANTIGONISH	45	37	62	0	-20	-23	0.41	0.50	160.	240.	280.		0.83
BRIDGEWATER	44	23	64	31	-15	-17	0.41	0.52	200.	260.	300.		0.86
CANSO	45	20	61	0	-17	-19	0.49	0.58	200.	260.	280.		0.76
DARTMOUTH	44	40	63	34	-16	-18	0.40	0.52	220.	280.	300.		0.87
DEBERT	45	26	63	28	-22	-25	0.39	0.50	160.	240.	280.		0.85
DIGBY	44	37	65	46	-15	-17	0.40	0.50	200.	260.	300.		0.87
GREENWOOD	45	33	62	34	-17	-19	0.36	0.48	200.	280.	300.		0.91
HALIFAX	44	39	63	36	-16	-18	0.40	0.52	220.	280.	300.		0.87
KENTVILLE	45	5	64	30	-18	-20	0.36	0.48	180.	260.	280.		0.88
LIVERPOOL	44	2	64	43	-14	-16	0.44	0.55	200.	280.	300.		0.83
LOCKEPORT	43	42	65	7	-14	-16	0.44	0.55	220.	280.	300.		0.83
LOUISBURG	45	55	59	58	-15	-17	0.52	0.60	240.	300.	300.		0.76
LUNENBURG	44	23	64	19	-15	-17	0.43	0.55	200.	260.	300.		0.84
NEW GLASGOW	45	35	62	39	-21	-23	0.40	0.50	180.	260.	280.		0.84
NORTH SYDNEY	46	13	60	15	-16	-18	0.47	0.55	240.	300.	300.		0.80
PICTOU	45	41	62	43	-21	-24	0.40	0.50	180.	260.	300.		0.87
PORT HAWKESBURY	45	37	61	21	-19	-22	0.59	0.69	180.	260.	300.		0.71
SPRINGHILL	45	39	64	3	-20	-23	0.39	0.50	180.	220.	260.		0.82
STEWIACKE	45	8	63	21	-21	-23	0.39	0.50	180.	240.	260.		0.82
SYDNEY	46	9	60	11	-16	-18	0.47	0.55	240.	300.	300.		0.80
TATAMAGOUCHE	45	43	63	18	-21	-24	0.40	0.50	180.	260.	300.		0.87
TRURO	45	22	63	16	-21	-23	0.37	0.48	160.	240.	280.		0.87
WOLFVILLE	45	5	64	22	-19	-21	0.36	0.48	180.	260.	280.		0.88
YARMOUTH	43	50	66	7	-13	-15	0.41	0.51	220.	280.	300.		0.86

PROVINCE AND LOCATION	LATITUDE		LONGITUDE		DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
	dd	mm	ddd	mm	JANUARY (C)	2.5% 1.0%	1/10	1/30	1/2	1/5	1/10	
	=====											
PRINCE EDWARD ISLAND:												
CHARLOTTETOWN	46	14	63	8	-20	-22	0.46	0.55	250.	350.	400.	0.93
SOURIS	46	21	62	15	-19	-21	0.41	0.50	250.	350.	400.	0.99
SUMMERSIDE	46	24	63	47	-20	-22	0.52	0.63	250.	350.	400.	0.88
TIGNISH	46	57	64	2	-20	-22	0.61	0.72	250.	350.	400.	0.81

PROVINCE AND LOCATION	LATITUDE		LONGITUDE		DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
	dd	mm	ddd	mm	JANUARY (C) 2.5% 1.0%		1/10	1/30	1/2	1/5	1/10	
=====												
NEWFOUNDLAND:												
ARGENTIA	47	18	53	59	-13	-15	0.57	0.69	300.	400.	450.	0.89
BONAVISTA	48	39	53	7	-17	-19	0.52	0.63	300.	400.	450.	0.93
BUCHANS	48	49	56	52	-21	-24	0.46	0.55	160.	200.	240.	0.72
CAPE HARRISON	54	57	57	57	-29	-31	0.46	0.55	280.	350.	400.	0.93
CAPE RACE	46	39	53	4	-14	-16	0.79	0.96	300.	400.	450.	0.75
CHANNEL-PORT AUX BASQUES	47	34	59	9	-15	-17	0.55	0.63	350.	450.	500.	0.95
CORNER BROOK	48	57	57	57	-19	-22	0.58	0.69	200.	300.	350.	0.78
GANDER	48	57	54	37	-18	-21	0.46	0.55	200.	280.	300.	0.81
GOOSE BAY	53	18	60	22	-31	-33	0.29	0.34	120.	160.	180.	0.79
GRAND BANK	47	6	55	46	-14	-16	0.59	0.69	300.	400.	450.	0.87
GRAND FALLS	48	56	55	40	-21	-24	0.46	0.55	160.	240.	280.	0.78
LABRADOR CITY	52	57	66	55	-35	-37	0.31	0.37	80.	140.	160.	0.72
ST ANTHONY	51	22	55	35	-24	-27	0.57	0.76	350.	450.	500.	0.94
ST JOHN'S	47	34	52	43	-14	-16	0.60	0.73	300.	400.	450.	0.87
STEPHENVILLE	48	33	58	35	-17	-20	0.62	0.72	260.	350.	400.	0.80
TWIN FALLS	53	30	64	32	-35	-37	0.31	0.37	80.	120.	140.	0.67
WABANA	47	38	52	57	-15	-17	0.56	0.69	300.	400.	450.	0.90
WABUSH LAKE	52	55	66	52	-35	-37	0.31	0.37	80.	140.	160.	0.72

PROVINCE AND LOCATION	LATITUDE		LONGITUDE		DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
	dd	mm	ddd	mm	JANUARY (C) 2.5%	1.0%	1/10	1/30	1/2	1/5	1/10	
=====												
YUKON TERRITORY:												
AISHIHIK	61	36	137	31	-44	-46	0.29	0.35	20.	40.	60.	0.45
DAWSON	64	4	139	25	-50	-51	0.20	0.24	20.	40.	60.	0.55
DESTRUCTION BAY	61	15	138	48	-43	-45	0.30	0.35	60.	80.	100.	0.58
SNAG	62	24	140	22	-51	-53	0.20	0.24	20.	40.	60.	0.55
TESLIN	60	10	132	43	-41	-43	0.19	0.25	20.	40.	60.	0.56
WATSON LAKE	60	7	128	48	-46	-48	0.19	0.24	40.	60.	80.	0.65
WHITEHORSE	60	43	135	3	-41	-43	0.28	0.34	20.	40.	60.	0.46

PROVINCE AND LOCATION	LATITUDE dd mm	LONGITUDE ddd mm	DESIGN TEMPERATURE		HOURLY WIND PRESSURES (kN/m**2)		DRIVING RAIN WIND PRESSURES (Pa)			RATIO DRWP/HWP 1/10
			JANUARY (C)		2.5%	1.0%	1/10	1/30	1/2	
NORTHWEST TERRITORIES:										
AKLAVIK	68 12	135 0	-44	-46	0.37	0.52	40.	60.	80.	0.46
ALERT	82 31	62 5	-43	-45	0.54	0.69	40.	100.	120.	0.47
ARCTIC BAY	73 2	85 11	-43	-45	0.40	0.50	120.	160.	200.	0.71
BAKER LAKE	64 18	96 3	-45	-46	0.42	0.50	120.	180.	220.	0.72
CAMBRIDGE BAY	69 7	105 3	-45	-46	0.30	0.34	60.	100.	120.	0.63
CHESTERFIELD INLET	63 21	90 42	-40	-41	0.44	0.52	160.	240.	260.	0.77
CLYDE	70 27	68 33	-41	-43	0.61	0.80	200.	220.	260.	0.65
COPPERMINE	67 50	115 5	-44	-45	0.33	0.42	60.	80.	100.	0.55
CORAL HARBOUR	64 8	83 9	-41	-43	0.88	1.20	140.	200.	260.	0.54
ESKIMO POINT	61 7	94 3	-40	-41	0.49	0.59	180.	240.	260.	0.73
EUREKA	79 59	85 57	-47	-48	0.47	0.60	80.	100.	160.	0.58
FORT GOOD HOPE	66 15	128 37	-46	-48	0.88	0.67	60.	80.	100.	0.34
FORT PROVIDENCE	61 21	117 40	-44	-46	0.26	0.32	80.	100.	120.	0.68
FORT RESOLUTION	61 10	113 40	-42	-44	0.29	0.36	100.	140.	180.	0.79
FORT SIMPSON	61 52	121 23	-45	-47	0.30	0.37	60.	80.	100.	0.58
FORT SMITH	60 0	111 53	-43	-45	0.30	0.37	60.	80.	100.	0.58
HAY RIVER	60 51	115 44	-41	-43	0.26	0.32	80.	140.	180.	0.83
HOLMAN	70 44	117 44	-43	-45	0.63	0.78	80.	120.	160.	0.50
INUVIK	68 21	133 43	-46	-48	0.39	0.55	40.	60.	80.	0.45
IQALUIT	63 45	68 31	-40	-42	0.56	0.69	120.	200.	260.	0.68
ISACHSEN	78 47	103 30	-46	-48	0.68	0.83	100.	140.	180.	0.51
MOULD BAY	76 14	119 20	-45	-47	0.47	0.60	100.	140.	180.	0.62
NORMAN WELLS	65 17	126 51	-46	-47	0.41	0.58	60.	80.	100.	0.49
NOTTINGHAM ISLAND	63 6	78 0	-38	-40	0.46	0.58	140.	200.	260.	0.75
PORT RADIA	66 5	118 2	-44	-46	0.38	0.48	60.	80.	100.	0.51
RAE-EDZO	62 50	116 3	-44	-46	0.34	0.43	60.	80.	100.	0.54
RANKIN INLET	62 49	92 5	-40	-41	0.46	0.55	160.	240.	260.	0.75
RESOLUTE	74 42	94 54	-44	-45	0.52	0.63	100.	180.	220.	0.65
RESOLUTION ISLAND	61 18	64 53	-35	-37	0.85	1.10	160.	200.	260.	0.55
TUNGSTEN	61 57	128 16	-49	-51	0.29	0.39	20.	40.	60.	0.45
YELLOWKNIFE	62 27	114 21	-43	-43	0.34	0.43	60.	100.	120.	0.59