0698416 A

F1 (F2)

TORNADO PROJECT SUMMARY SHEET

1. DATE AND TIME Aug. 14, 1984 1940 EDT

2. LOCATION OR PATH (attach map) Downsview, Ont

3. PATH LENGTH ☐ NOT KNOWN ☐ <1 mi; ☑ 1-4mi; 4km ☐ 5-10mi; ☐ 11-50mi; ☐ LENGTH IF>50mi

4. PATH WIDTH 100m 5. TORNADO PART OF SQUALL LINE? ☐ YES; ☐ NO; ☐ UNKNOWN:

6. ANY UNUSUAL COLORATION? ☐ YES; ☐ NO; ☐ UNKNOWN

7. ANY UNUSUAL SOUND? ☐ YES; ☐ NO; ☐ UNKNOWN

8. IF ANSWER TO 6 OR 7 YES, ELABORATE;

9. LIST ANY ASSOCIATED PHENOMENA (Such as hail, vivid lightning heavy rain, no rain, etc.) - large hail stones → 6 cm - heavy rain → 50 mm

10. TOTAL DAMAGE ESTIMATE $ "millions" 11. TOTAL DEATHS

12. TOTAL INJURED 4 13. TOTAL HOMELESS

14. LIST ALL REFERENCES

15. SUMMARIZE REMARKS PERTAINING TO (a) FUNNEL; (b) INTERESTING OR CAPRICIOUS EVENTS.

- major damage

T.D. 17 619500
4844500

L.O. 17 617000
4841400

b)

TORNADO in DOWNSVIEW ONTARIO

August 14, 1984

Investigation, photographs and report by Steven Leitch.

INTRODUCTION:

On the evening of August 14, 1984 at about 7:35 pm a tornado touched down in a residential area of Downsview near Jane Street and Frith Road. It moved in a nearly straight line to a ravine east of Norfield Cr. west of Albion Road near the Humber river. It partially unroofed at least 4 homes, ripped up portions of 4 wareheuse roofs, collapsed a factory block wall and roof, damaged trees, metal garden sheds, telephone poles, power lines and cars. A heavy rainfall and large hail immediately followed the tornado breaking many precipitation records. The tornado tracked from northeast to southwest for 4.0 km and had a path width of about 100m $\pm$ 50m. To the best of my knowledge there were no injuries or fatalities.

SEQUENCE OF EVENTS:

It had been sunny, warm and humid for much of the day. Late in the afternoon showers blossomed to the east of Metropolitan Toronto and then tall clouds built rapidly back over the north end and to just west of the city. Shower movement was towards the northeast. At 6 pm the temperature was 30°C. By 7 pm a friend called my attention to dark clouds passing over us from the west. I live in a high-rise apartment in Iniversity City with a view only to the east. The heavy clouds passed overhead and moved 1 or 2 km to the northeast. Watching from my balcony,heavy rain began to fall east of us and started to move closer. The clouds seemed to have stopped their northeastward movement and, by 7:20, appeared to be comming back. Heavy rain was falling about 500m to the east and the rain free cloud base overhead was getting very dark. Lower cloud fragments just to the east were moving northward and, yet, the low pieces directly overhead were moving south. It was becomming apparent that this area of dark cloud just east of us and partly overhead was slowly rotating counter-clockwise (if viewed from above).

Over the next 5 minutes the area of rotation became tighter, more clearly defined and rotated a little faster. Sudden wind gusts from the northwest whisked leaves and loose papers up into the air. My wife and her brother both said that the sky and clouds were greenish, but I couldn't see that colour, everything just looked very dark. By 7:30 the area of rotation was more vigorous with smooth curving clouds spiraling into the center and was situated right overtop the intersection of Finch Avenue and Sentinel Road.

I telphoned the Ontario Weather Centre and reported a rotating wall cloud over Downsview hoping that they might be able to issue advance warning of a possible tornado. In the next 5 minutes the rotating cloud base moved out of view over the right side of our building towards the southwest. Heavy rain began to fall and all sight of the clouds was lost by 7:35. At about 7:35-40 a tornado touched down 1.5 km southwest of us and continued to travel southwest for 4 km and probably lifted off the ground at about 7:45-50.

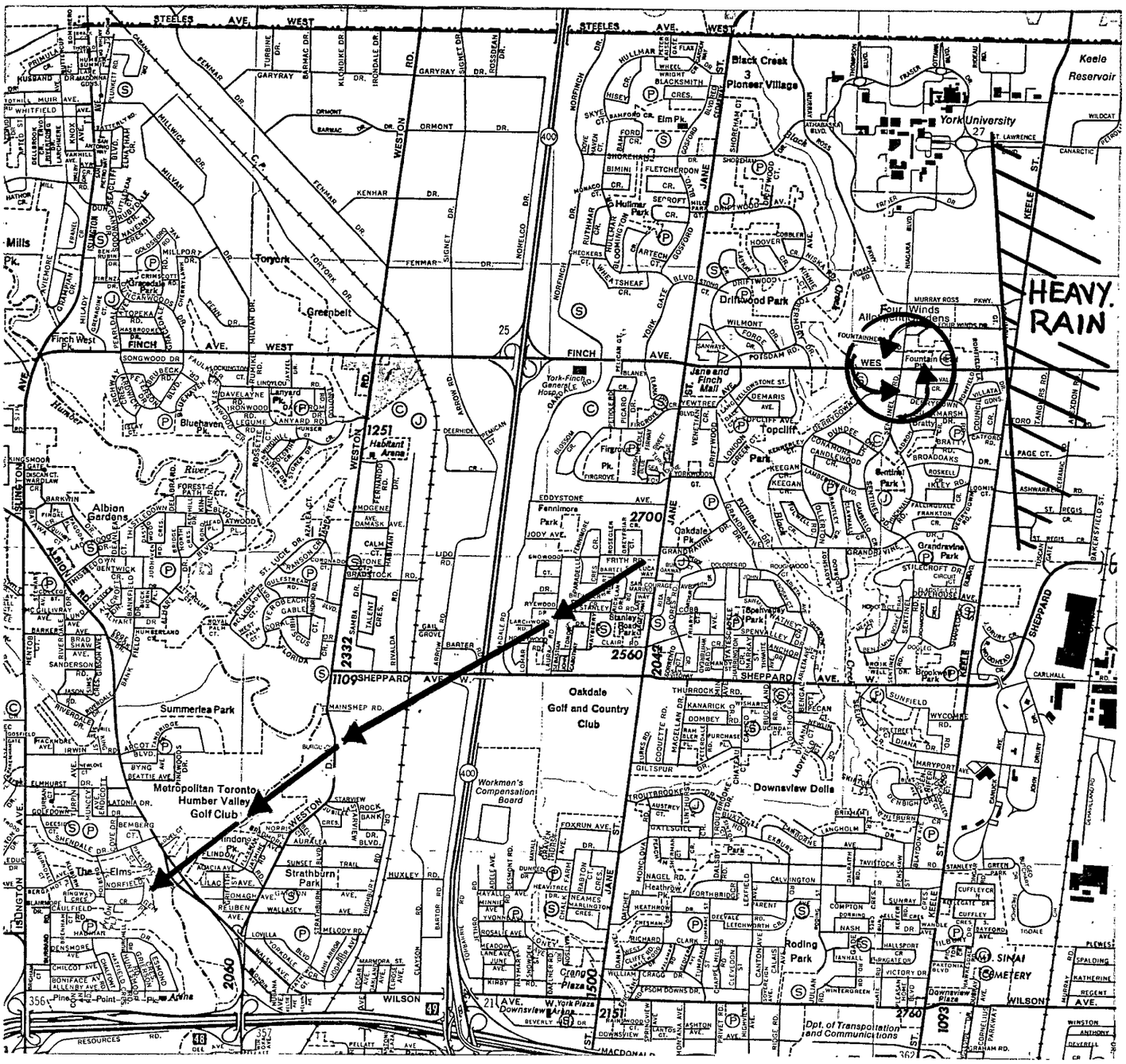
CONCLUSION:

Based on the evidence presented here this was an F1 to F2 strength tornado. In more detail the tornado was an F0 with an approximate width of 100m $\pm$ 50m, but there was a more destructive F1 to F2 core with an estimated width of 3-5m that produced the most noteable damage. This destructive core was probably a suction vortex circulating within the wall of the tornado. The havoc this vortex wrecked upon property appeared more intermittent, dependent on whether its forward motion was added to that of the tornado or whether it was in retograde relative to the tornadoe's southwesterly movement.

An airline pilot enroute from Buffalo to toronto reported a huge mushroom shaped thunderstorm top over Toronto on the evening of the storm. On radar precipitation echo movements were from southwest to northeast. The track of the tornado was in the OPPOSITE direction. It has been suggested that perhaps this whole thunderstorm, over the Toronto area, was a rotating supercell. I would surmise that it was rotating counter-clockwise and the tornado occurred in the northwest quadrant producing the unusual track orientation. I could not calculate the tornadoe's speed along its track because times were not exact.

F Scale Definitions

FO	(64 - 115 km/h) T.V. antennae bent. A few roof shingles removed from houses and roofing stripped from barns. Patches of siding removed from houses, awnings or canopies damaged. Aluminum garden sheds moved or buckled and garden furniture blown around. Fences blown down. Trees broken or uprooted (intermittently in heavily treed bush lots).
F1	(116 - 179 km/h) Large areas of roofing material stripped from homes or industrial buildings. Barn roofs entirely removed and boards or siding removed from barn walls. Some impact damage from flying missiles. Unanchored buildings twisted on their foundations. Steel hydro-electric transmission towers knocked down. Summer cottages moved off their foundation.
F2	(180 - 251 km/h) Structural failure of roofs and porches. Barns demolished to the foundation. Empty stave concrete silos blown over or the upper portions of partly filled stave silos demolished. Unanchored 1 - storey houses moved entirely off their foundation. Cottages rolled over or carried short distances. Farm wagons or equipment carried short distances. Areas of total damage in heavily treed bush lots. Considerable impact damage from flying missiles.
F3	(252 - 330 km/h) Upper storeys of brick houses destroyed. Extensive structural damage to frame houses. Heavy farm machinery and automobiles moved or upset. Unanchored 2 - storey frame houses moved entirely off their foundation. Tombstones blown over or carried short distances. House trailers entirely demolished. Extensive impact damage from flying missiles.
F4	(331 - 416 km/h) Two-storey brick homes almost completely destroyed. Empty poured concrete silos blown down. Automobiles, vans, heavy farm equipment carried long distances through the air. Extensive structural failure of industrial buildings.
F5	(417 - 509 km/h) Little remains intact.



Map of the tornado path along the ground and position of rotating storm base over University City at 7:30 pm.

DEBRIS from the roof of a Brewster Cres. home is visible in a neighboring yard in this aerial photo of the tornado-ravaged residential area.

-bill sandford, sun

ONTARIO REGION

TECHNICAL NOTES

ORTN-84-9

THE METROPOLITAN TORONTO TORNADO OF AUGUST 14, 1984

BY

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ONTARIO WEATHER CENTRE

NOVEMBER 1984

Environment Canada | Environnement Canada
Atmospheric Environment Service | Service de l'environnement atmosphérique

Canada

THE METROPOLITAN TORONTO TORNADO

OF

AUGUST 14, 1984

1. INTRODUCTION

On the evening of August 14, 1984, a tornado touched down in a densely populated area of Metropolitan Toronto causing extensive damage to houses and factories along a three kilometre path.

The unusual characteristic of this tornado is the motion from east-northeast to west-southwest. Statistics on tornado motion published by the U.S. Department of Commerce indicate that motion into the southwest quadrant, although not unheard of, is very rare. Only nine tornadoes out of nearly six thousand conterminous U.S. tornadoes investigated during the period 1950 to 1978 moved toward the west-southwest.

The purpose of this paper is to examine and present the pertinent meteorological features associated with the storm and discuss the unusual direction of motion of the tornado, which appears to have moved in a direction opposite to that of the mean tropospheric flow.

2. PHYSICAL CHARACTERISTICS

2.1 General Description

A tornadic storm occurred over the northwestern section of Metropolitan Toronto during the evening of August 14, 1984. This was accompanied by large hail (6 cm in diameter) and a swath of unprecedented heavy rainfall amounts for southern Ontario. A separate report on the precipitation aspect of the storm will be prepared by the Scientific Support Division (SSD) in AES Ontario Region.

An investigation of the tornado damage led to a complete delineation of the track (Figure 1). The damage path (point "A" to point "B") was estimated to be approximately 2.8 km in length while the width varied from 20 to 130 metres.

Tornado severity is commonly estimated by using the Fujita F-scale (Fujita 1973). According to the damage done, this is classified as a F-1 tornado. However, F-2 damage was reported in the industrial area. A detailed damage report is available upon request from the Ontario Weather Centre.

2.2 Speed and Direction of Motion

According to at least two eyewitnesses and from one power failure time, the first touch down of the tornado occurred shortly after 7:30 p.m., while funnel dissipation, as seen by one witness, took place shortly before 7:45 p.m. EDT. The tornado's translational speed was estimated at 17 km/h. The direction of motion of this storm, as seen by at least a dozen witnesses, photographed by a least one person and verified by an investigation of the damage, was from east-northeast to west-southwest. Motion into the southwest quadrant is rather unusal in tornado

2.2 Speed and Direction of Motion - Cont'd...

climatology. In this particular case, what makes it even more unusual is the fact that the tornado appears to have moved against the mean tropospheric flow. The unusual direction of motion encountered in this storm will be the primary focal point of this paper.

3. METEOROLOGICAL CHARACTERISTICS

3.1 Synoptic Scale Features

3.1.1 Dynamic Features

At the 85 kilopascal level (Figures 2a and 2b), the wind field over Southwestern Ontario was weak at 1200 GMT August 14th and a well defined axis of maximum moisture, oriented from southeast to northwest was lying across central Lake Erie. By 0000 GMT August 15th, the winds over Buffalo had increased to 15 Kts from the west-southwest, while the axis of maximum moisture had moved to just east of Toronto.

The 70 kilopascal charts (Figures 3a and 3b) show a broad cold low with a centre over northern Lower Michigan and a second one just north of western Lake Ontario at 1200 GMT August 14th with a weak flow over the southern Great Lakes. However, 12 hours later (Figure 3b), the low centres had merged into one and moved to 120 km northwest of Maniwaki while a moderate westerly flow had developed over Southern Ontario. Another important feature at this level is the strong dew point gradient which moved eastward across Southwestern Ontario during the day to lie just west of Toronto by 0000 GMT August 15th.

At 50 kilopascals (Figure 4a), a cold low was centered over Northern Lake Huron at 1200 GMT August 14th. By 0000 GMT August 15th (Figure 4b), the cold low had moved to near Sudbury and the circulation as well as the vorticity associated with the cold low had increased considerably. In addition, a sharp trough, extending southward from the cold low through Toronto, had developed. During this 12-hour period, the flow over the southern Great Lakes had remained west to southwest and increased to around 40 kt by 0000 GMT. Postive vorticity advection in advance of this trough was weak; however, the temperature field indicates that cold air advection took place at this level and a net cooling of 5°C occurred over Buffalo between 1200 GMT August 14th and 0000 GMT August 15th.

From Figure 5a it can be seen that at 1200 GMT a jet axis was oriented southwest to northeast across Southeastern Ontario with a wind maxima of approximately 90 kt over northern Ohio at 25 Kilopascals. This jet axis had a second branch oriented north-northwest to south-southeast across central Lake Superior with a strong directional shear line lying across Lake Huron. Twelve hours later (Figure 5b), the western branch of the jet

3.1.1 Dynamic Features - Cont'd...

broke through the shear line forming a strongly cyclonic jet axis over southern Ontario. The 90 kt wind maxima had moved over Buffalo and the left exit region of the jet was located over the western end of Lake Ontario. This implies that strong high level divergence was taking place over western Lake Ontario area during the 12-hour period prior leading up to the severe storm.

The presence of a low level moist tongue and a strong mid level dew point gradient were the main ingredients at low and mid troposphere contributing toward the development of the tornadic storm. At higher levels, the major contribution came from a marked temperature drop, strong divergence associated with the left exit region of the jet and weak positive vorticity advection.

3.1.2 Thermodynamic Features

a) Stability Indices

The lifted index analysis for 0000 GMT August 15th (Figure 6) shows the presence of a very unstable air centred near Buffalo. Values for various other instability indices for Buffalo were as follows: Georges K index 45, Total Totals 59, Showalter index -8, and SWEAT index 385. These indicate a strong potential for the development of severe weather over the western end of Lake Ontario.

b) Tephigrams

From Buffalo sounding it can be seen that at 1200 GMT August 14th (Figure 8a), typical characteristics found with average tornado ascents (Beebe 1958), while present to some degree, fell short of that associated with tornadic storms. The absence of a mid level dry inversion was most notable. Latent instability was present in the layer between the surface and the 72 kPa level and potential instability existed in the layer between the surface and the 70 kPa level and in few other layers above 62 kPa. Twelve hours later (Figure 8b), substantial cooling had taken place in the layer between 70 and 40 kPa, with maximum cooling (5°C) occurring at the 50 kPa level (note that mandatory levels only are available). This resulted in the formation of a strong inversion between 50 and 40 kPa with a very unstable lapse rate below it. The major contribution toward this cooling came from the east-southeastward progression of the cold vortex present over northern Lake Huron 12 hours earlier. Some evaporative cooling associated with the rapid growth of super cells (Miller 1967) might have contributed as well. TOVS data did substantiate the presence of the cold pool aloft.

b) Tephigrams - Cont'd...

The height of the wet bulb zero (WBZ) over Buffalo remained nearly constant at 3800 metres through the 12 hour period immediately before the storm.

c) Hodographs

A study by Gray (1969) showed that the average vertical shear of the horizontal wind in the layer between the surface to the 85 kPka level for severe storm-spawned tornado soudings was not less than 45 kt. The hodograph for Buffalo (Figure 8c) indicates that, apart from some directional shear, no significant wind shear due to speed was present 12 hours before the storm. At storm time (Figure 8d), winds backed up to 40 kPa then veered to 25 kPa. At this time, an average wind shear of 6kt/1000 ft was present betwen 40 and 30 kPa. Both these soundings indicate that, prior to and at storm time, the mean wind direction was from the south-southwest throughout the entire troposhere.

3.2 Mesoscale Features

3.2.1 Satellite/Radar

Satellite imagery coverage was of no help in this case. GOES East, the weather satellite over the eastern half of the North American Continent, became unserviceable on July 22, 1984.

GOES West pictures, due to a large zenith angle, were badly distorted and did not indicate any particular sign of the presence of the tornado over Toronto.

Radar facsimile chart recordings of this storm were obtained from King City weather radar located approximately 32.5 km north of Lester B. Pearson International Airport (YYZ).

King City radar charts (Figure 9a to 9f inclusive) show the development and motion of the cells just prior to and at the time of the tornado. The tornado occurred just east of the square labelled YYZ shortly after 2330 GMT. From these figures, it is evident that line "BC", which formed about 2300 GMT (Figure 9b), developed southwestward and intensified to maximum radar intensity (Max R above 2 km greater than 65 mm/h) by 2310 GMT (Figure 9c). This was caused by the development of new cells which occurred at the southwest end of line "BC". Meanwhile, the northeastern end of the lines "BC" and cell "A" moved east-southeastward at approximately 30 km/h and intensified to maximum radar intensity by 2320 GMT (Figure 9d).

3.2.1 Satellite/Radar - Cont'd...

Maximum echo tops over Toronto, as reported by King City and Exeter weather radars, were 15 km at the time of the tornado, while the tropopause at Buffalo was 12 km. This implies that a tropopause penetration of at least 3 km was present at storm time.

Echoes at the southwest end of line "BC" merged with cell "A" at approximately 0000 GMT. Before this time, the strong echo at the southwest end of line BC exhibited a southwestward motion, whereas all other echoes, including the remainder of line "BC" moved with a southeastward component. After 0000 GMT, however, even the southwestern end of line "BC" exhibited a southeastward motion.

3.2.2 Surface Weather Reports

Figures 10a to 10d inclusive, show some peculiarities in the temperature, dew point and wind trends in the Toronto area during the afternoon and evening of August 14th. At Pearson International Airport (Figure 10a), between 1600 and 2100 GMT, the wind was light northwesterly, the temperature rose from 25 to 31°C while the dew point dropped from 20° to 14°C. After 2100 GMT, the temperature started to drop while the dew point rose abruptly, i.e. 6°C in one hour, and the wind shifted to southeast and increased to 25 km/h by 2300 GMT.

Rain associated with the thunderstorm was reported at 2340 GMT. At the same time, the wind shifted to the northwest and became gusty. Then it veered to southeast by 0100 GMT. A similar trend in the temperature and dew point occurred at AES Headquarters (Figure 10b) as reported by Data Acquisition Branch. At this location the wind also shifted from northwest to south-southeast after 2100 GMT but remained light and precipitation was first reported at 2320 GMT. Toronto Island (Figure 10c) did not show such abrupt changes. There, a sea breeze kept the dew point in the 21 to 23°C range and the wind from the south-southwest at approximately 15 km/h. Hamilton (Figure 10d) did indicate a similar trend in temperature and dew point as YYZ did, but the wind remained northwesterly throughout the entire period. The relative position of the above mentioned locations is shown in Figure 7.

3.2.3 Mean Sea Level Pressure Analysis

During mid morning on August 14th, a surface trough of low pressure moved east of Toronto (Figure 11a), then it gradually weakened during the afternoon. Meanwhile, a second convergence line oriented northeast to southwest, anchored near Toronto, developed by 1800 GMT (Figure 11b). This became more pronounced during the afternoon and remained quasi-stationary until 0000 GMT, when it moved southeastward over Lake Ontario. Pressure

3.2.3 Mean Sea Level Pressure Analysis - Cont'd...

reports for the automatic weather station at Barrie (WCU) are suspicious. They are thought to be 0.1 to 2.2 kPa too low, however, no adjustment has been made in the analysis. A small low pressure centre was also evident in the Toronto area by 2100 GMT (Figure 11c). This maintained its identity until 0000 GMT (Figure 11f), then vanished. The presence of this feature added to the low level convergence already present along the trough line. Another notable feature from this series is the presence of a sea breeze which maintained southerly winds and high dew points at Toronto Island Airport during the afternoon and early evening. The sea breeze acted as a mechanism by which low level moisture convergence was constantly supplied to the storm area.

4. DISCUSSION

From the examination of the pertinent meteorological data, evidence indicates that in the Toronto area the environment was favourable for the development of severe storms. Strong low level convergence was supplied by a sharp surface trough and a meso low which was anchored near Toronto during the six hour period prior to the storm. The presence of the synoptic and smaller scale features investigated in this paper can explain the development of the tornadic storm but they do not account for the direction of its motion.

The presence of a lake breeze during the afternoon in question, assisted in maintaining a quasi-stationary convergence line over the city and, together with an approaching moist tongue from the west, contributed favourably toward the persistence of strong low level moisture convergence over the city towards which the line of radar echoes may have propagated. This, although it may explain the southwestward propagation of the line, does not explain either the motion of the tornado or the occurrence of the sharp dew point drop immediately to the north of the convergence line at Pearson International Airport and AES Headquarters. Figures 10a and 10b show that the drop in surface dew points occurred with light northwesterly winds. Under these conditions, some drying may be accounted for by the subsidence warming generated in the downslope flow from the Niagara Escarpment. However, the downslope flow, by itself, could not have been responsible for such large dew point changes. Some other mechanism, though not obvious, must have been at play.

Using the criteria of Davis-Jones and Kessler (1974), this tornado would be classified as a type "A" tornado. This type forms under new convective cells which continuously develop on the right rear flank of large cumulonimbus clouds. The average tornado bearing storm moves slightly slower than and to the right of (but never opposite to) the mean environmental wind in the layer from the surface to 12 km (Browning 1964.)

According to a study done by Newark (1983), the predominant translational motion of tornadoes is from the west in the Ontario/Quebec region. In this particular case the tornado moved from approximately 60 degrees, while the

4. **DISCUSSION** - Cont'd...

mean tropospheric flow was from about 200 degrees. This would imply a direction of motion almost opposite to the mean troposheric flow. Hitherto, no extant theory on storm motion can explain tornado motion against the mean tropospheric flow.

The small scale surface data presented in this paper strongly suggest the presence of intense mesoscale phenomena. Such phenomena must have played an integral role in determining the motion of the tornado as well as that of the thunderstorm cell spawning the tornado. From the available data, however, no definite conclusion can be substantiated.

5. **SUMMARY AND CONCLUSIONS**

At approximately 7:35 p.m. EDT on August 14, 1984, a slow moving tornado travelled west-southwestward across a densely populated area of the northwestern section of Metropolitan Toronto. The tornado rotated cyclonically (according to at least two witnesses) under the parent cloud and it dissipated as it moved away from the cloud centre. It travelled through a distance of 2.8 km and was in view for about 10 minutes, moving with a translational speed of approximately 17 km/h. West-southwest motion is seldom encountered in tornado climatology (Schaefer et al 1980) and in those few cases where such an unusual direction was detected, it was observed that the mean tropospheric flow had a component of motion along the direction of the tornado track.

An examination of the synoptic scale features revealed that the severe weather environment was such as to support the development of a tornadic storm. The only dynamic element missing was a well defined low level jet. However, its absence was probably compensated by strong low level convergence caused by intense mesoscale processes. The synoptic scale winds, prior to and at the storm time, were from the southwest. This would lead to the conclusion that the tornado moved in a direction nearly opposite to the mean tropospheric flow. Because this is contrary to the present theories of severe storm motion, it is reasonable to assume that strong mesoscale processes were present and were responsible for the storm's unusual motion. With this in mind, many small scale features were investigated. Several of these turned out to be quite pronounced and interesting. However, a definite conclusion could not be formulated. In the future, perhaps if wind profilers become operational, storm motion may be explained and predicted with some degree of accuracy. Furthermore, by investigating other cases similar to this one (if any), or by a more complete examination of the data available for this particular one, more tangible evidence responsible for the unusual motion of this tornado may surface.

6. **ACKNOWLEDGEMENTS**

A special thanks to Mr. Fred Conway for the assistance kindly provided toward the compilation and completion of this paper. Data from AES Headquarters was provided by the Measurement Technology Section of AES Data Acquisition Branch.

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FIGURES

Figure 1:	Track of the tornado.
Figures 2a and 2b:	85 kPa analysis.
Figures 3a and 3b:	70 kPa analysis.
Figures 4a and 4b:	50 kPa analysis.
Figures 5a and 5b:	25 kPa analysis.
Figure 6:	Lifted index analysis.
Figure 7:	Toronto area map.
Figures 8a and 8b:	Buffalo soundings.
Figure 8c:	Buffalo rawinsonde 1200 GMT August 14, 1984. Numbers plotted refer to height levels in thousands of feet. Wind speed up to 12 thousand feet is magnified four times.
Figure 8d:	Buffalo rawinsonde 0000 GMT August 15, 1984. Numbers plotted refer to pressure levels in mb.
Figures 9a to 9f:	King City weather radar facsimiles.
Figures 10a to 10d:	Hourly traces of temperature (°C), dew point (°C), as well as wind speed (km/h) and direction.
Figures 11a to 11f:	Mean sea level pressure (kPa) analysis.

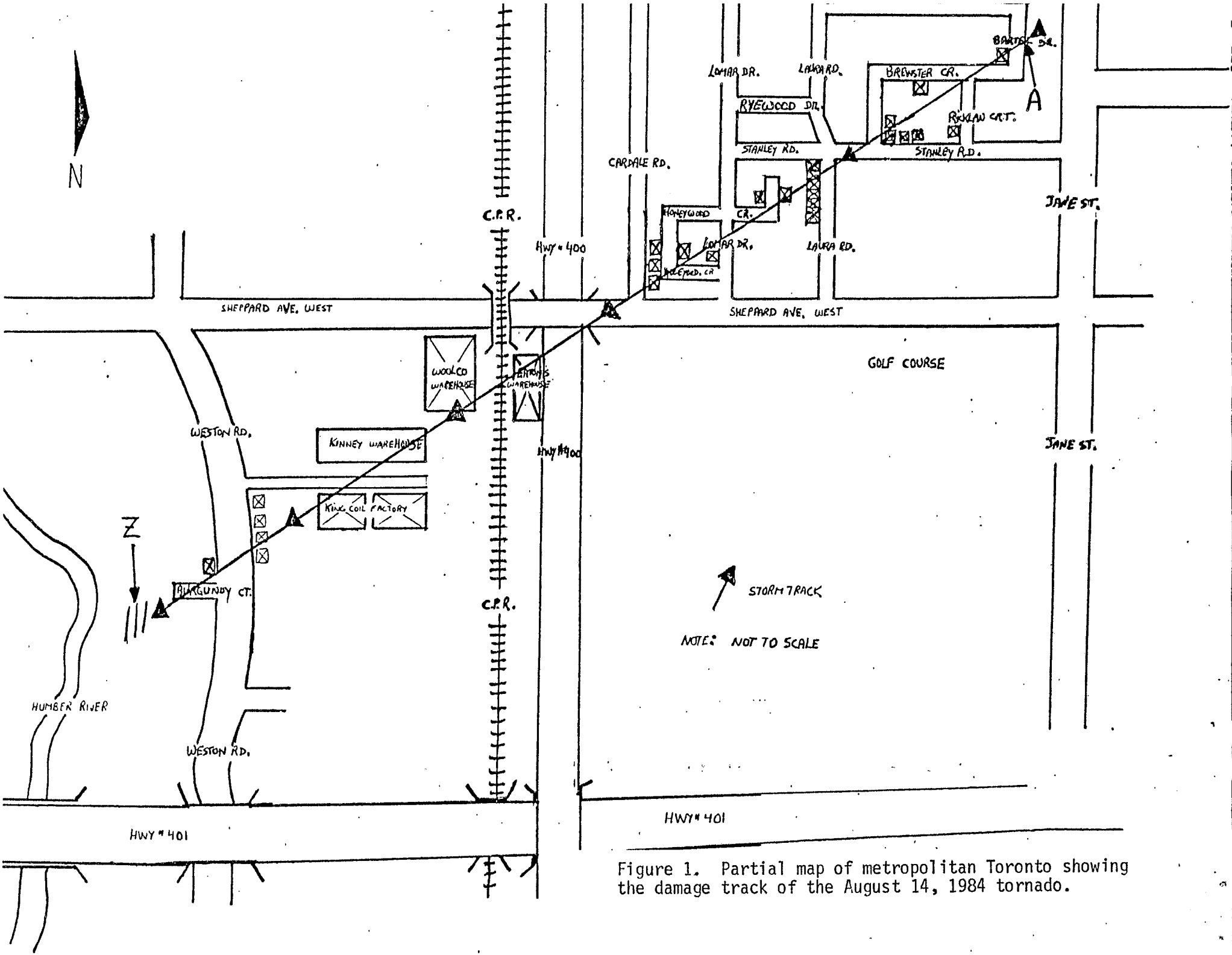


Figure 1. Partial map of metropolitan Toronto showing the damage track of the August 14, 1984 tornado.

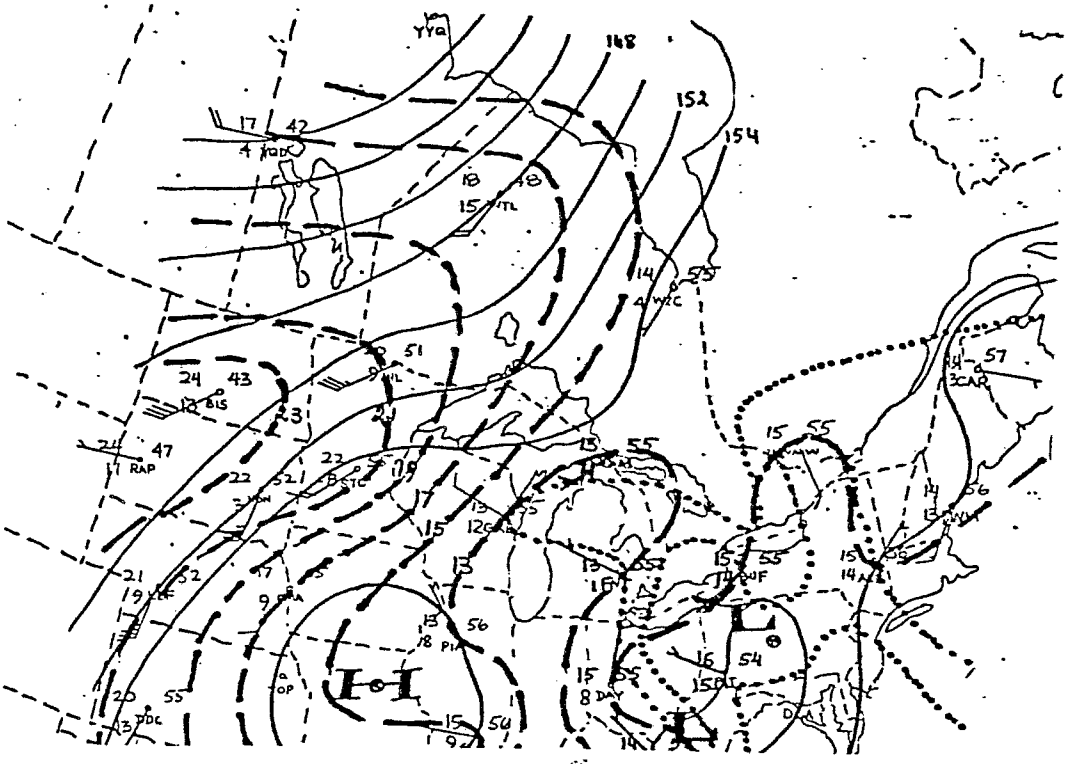


Figure 2a. 85 kPa analysis. 1200GMT August 14, 1984. Contours (solid lines) in decametres, temperature (dashed lines) in °C and dew point temperature (dotted lines) in °C.

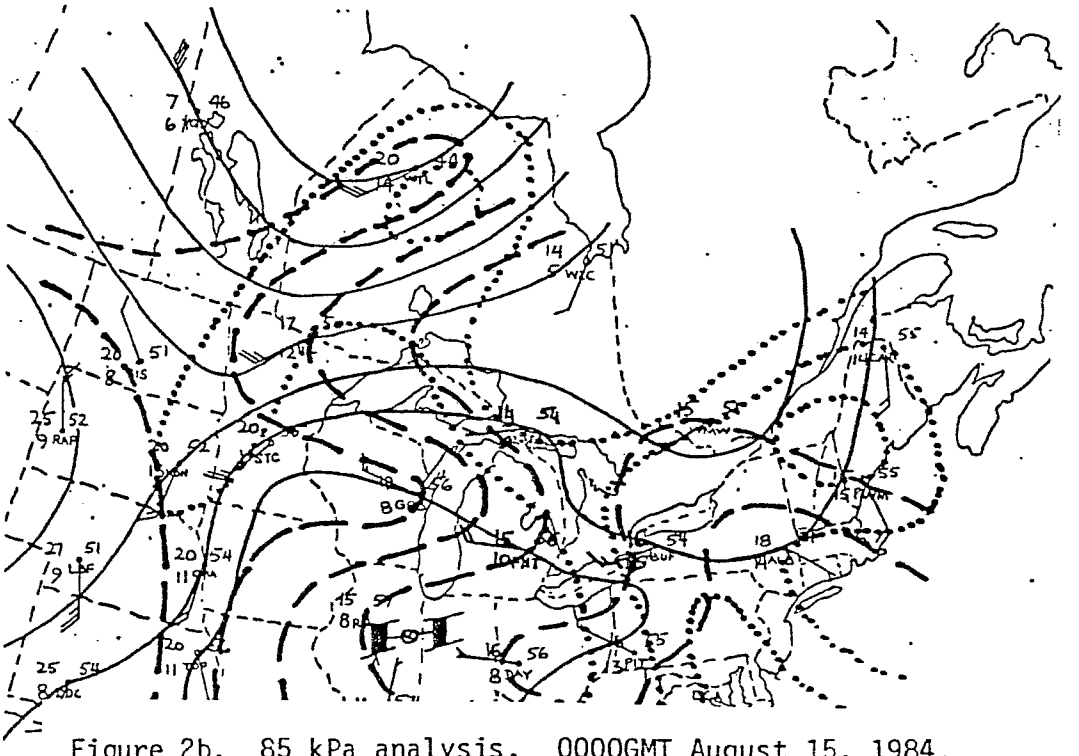


Figure 2b. 85 kPa analysis. 0000GMT August 15, 1984. Contours (solid lines) in decametres, temperature (dashed lines) in °C and dew point temperature (dotted lines) in °C.

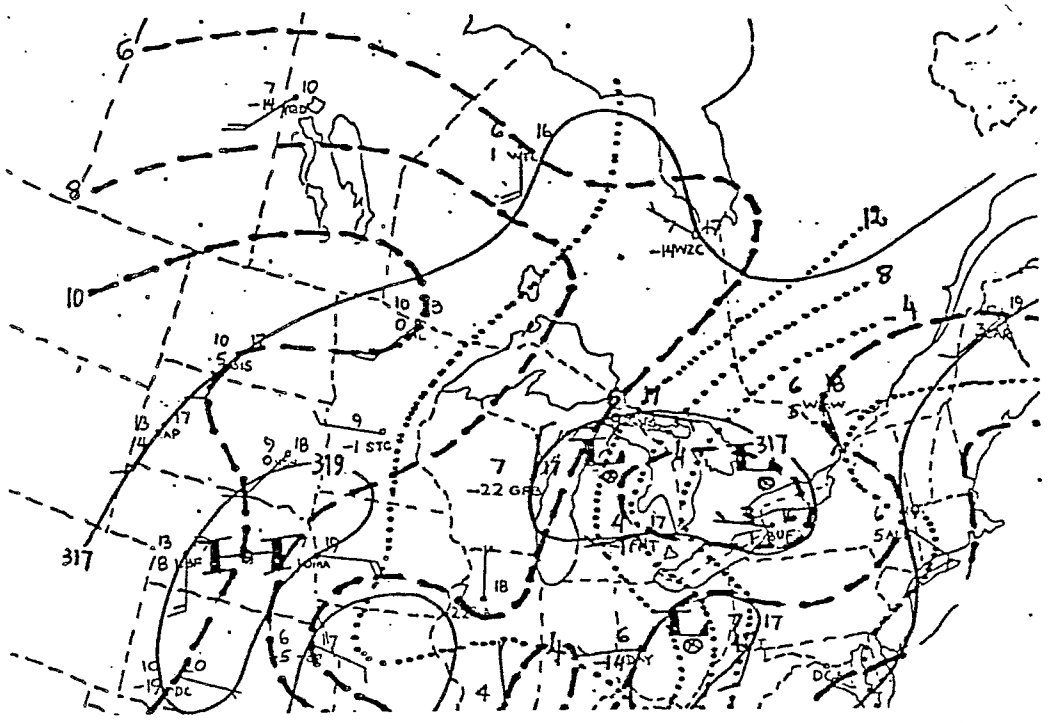


Figure 3a. 70 kPa analysis. 1200GMT August 14, 1984. Contours (solid lines) in decametres, temperature (dashed lines) in °C and dew point temperature (dotted lines) in °C.

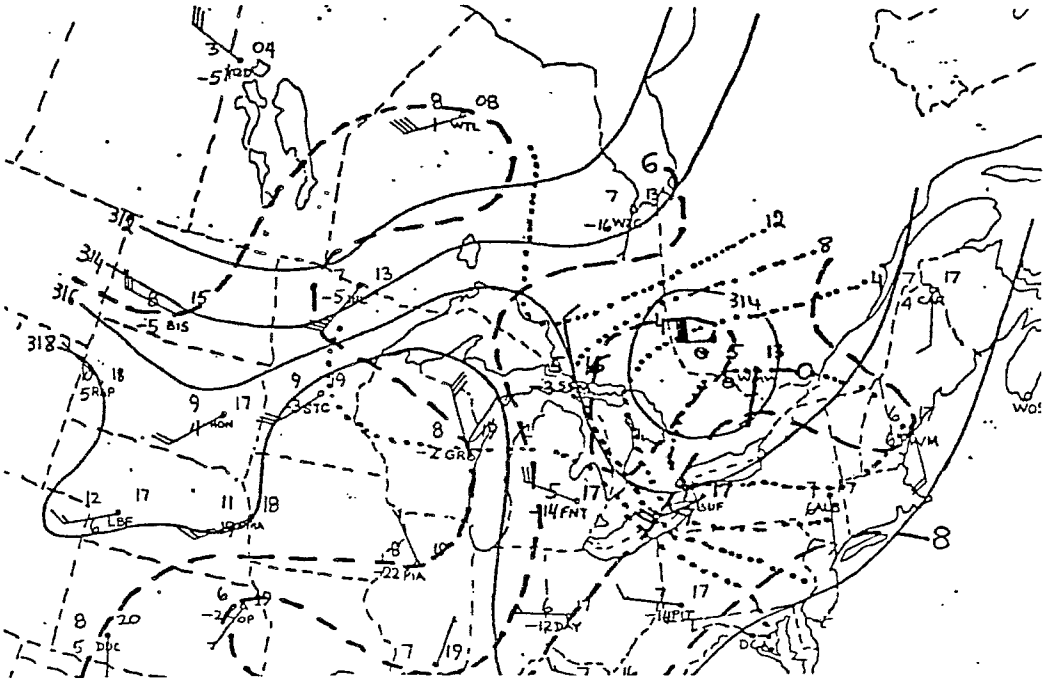


Figure 3b. 70 kPa analysis. 0000GMT August 15, 1984. Contours (solid lines) in decametres, temperature (dashed lines) in °C and dew point temperature (dotted lines) in °C.

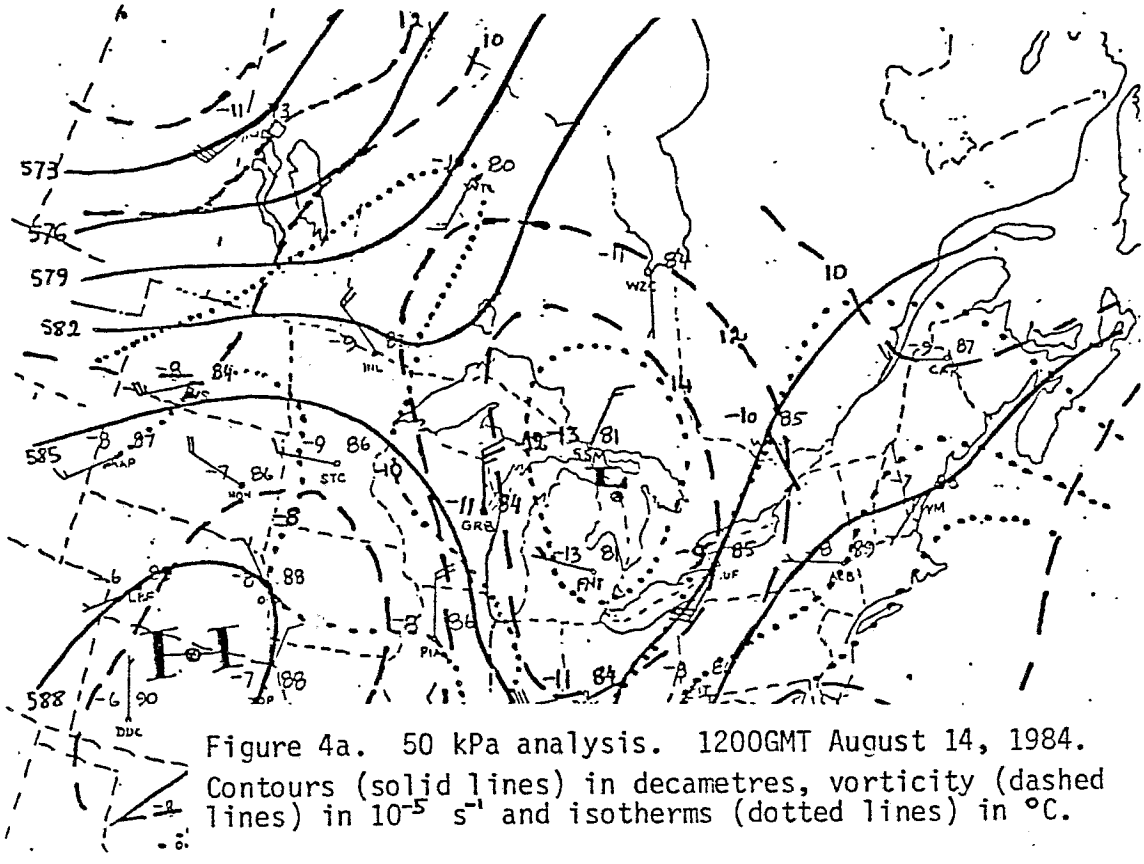


Figure 4a. 50 kPa analysis. 1200GMT August 14, 1984. Contours (solid lines) in decametres, vorticity (dashed lines) in 10^{-5} s^{-1} and isotherms (dotted lines) in °C.

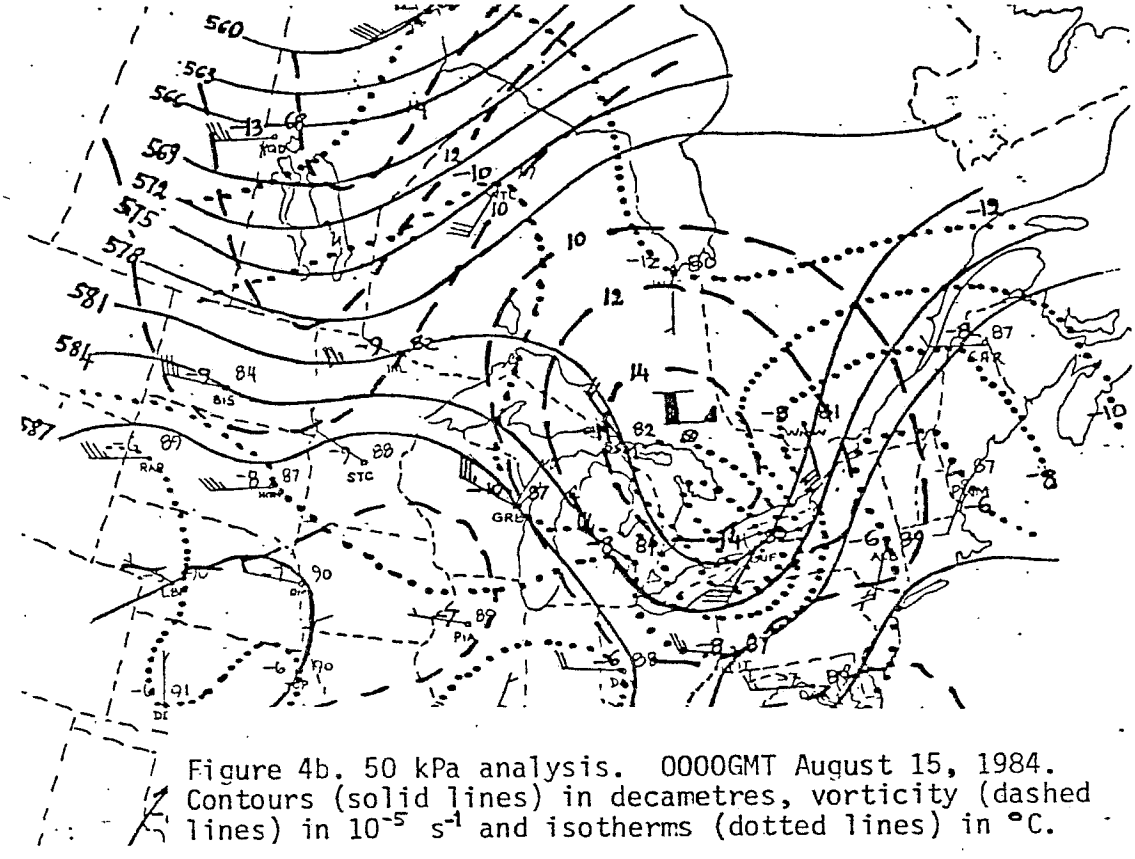


Figure 4b. 50 kPa analysis. 0000GMT August 15, 1984. Contours (solid lines) in decametres, vorticity (dashed lines) in 10^{-5} s^{-1} and isotherms (dotted lines) in °C.

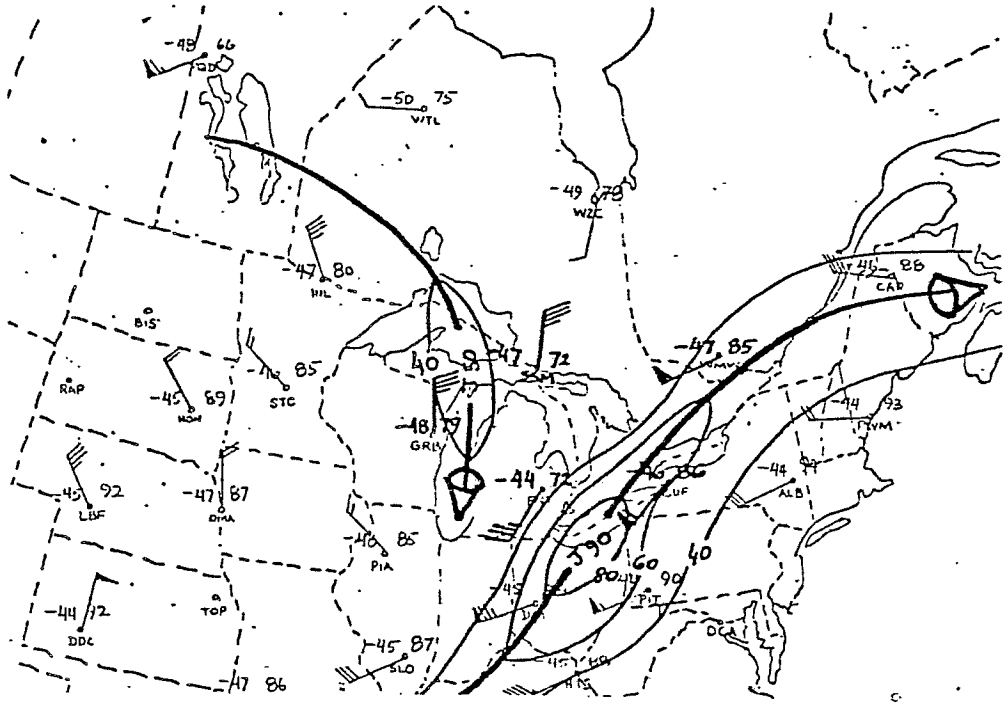


Figure 5a. 25 kPa chart. 12000GMT August 14, 1984. Isotachs (thin solid lines) and jet (heavy solid line) in kt.

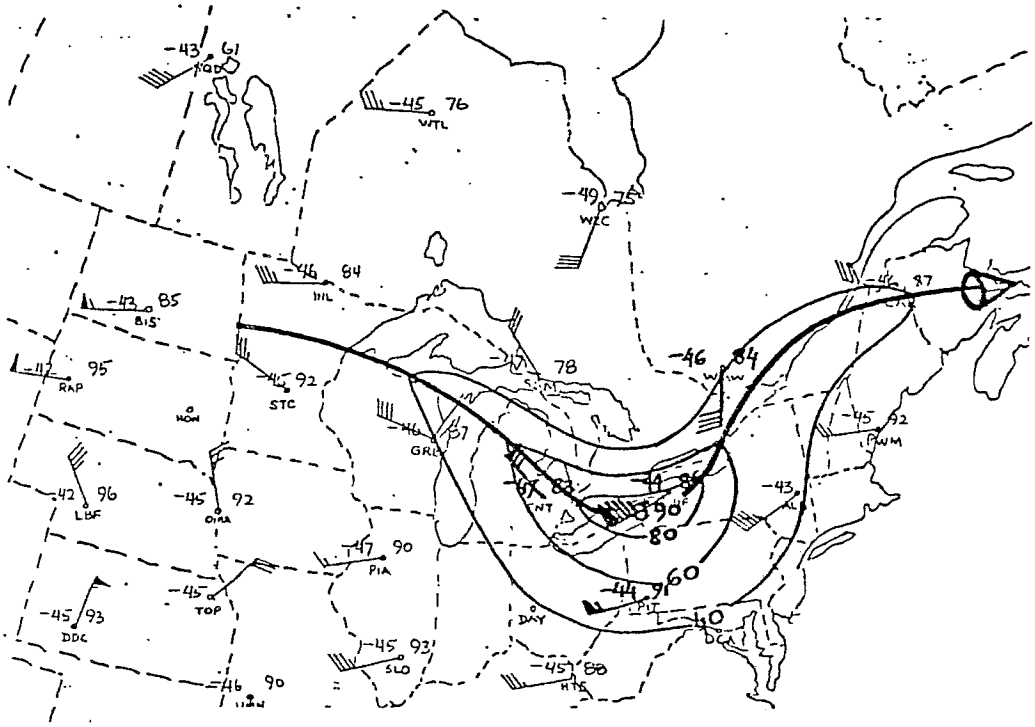


Figure 5b. 25 kPa analysis. 0000GMT August 15, 1984. Isotachs (thin solid lines) and jet (heavy solid line) in kt.

Figure 6. Lifted index analysis. 0000GMT August 14, 0000GMT August 15, 1984.

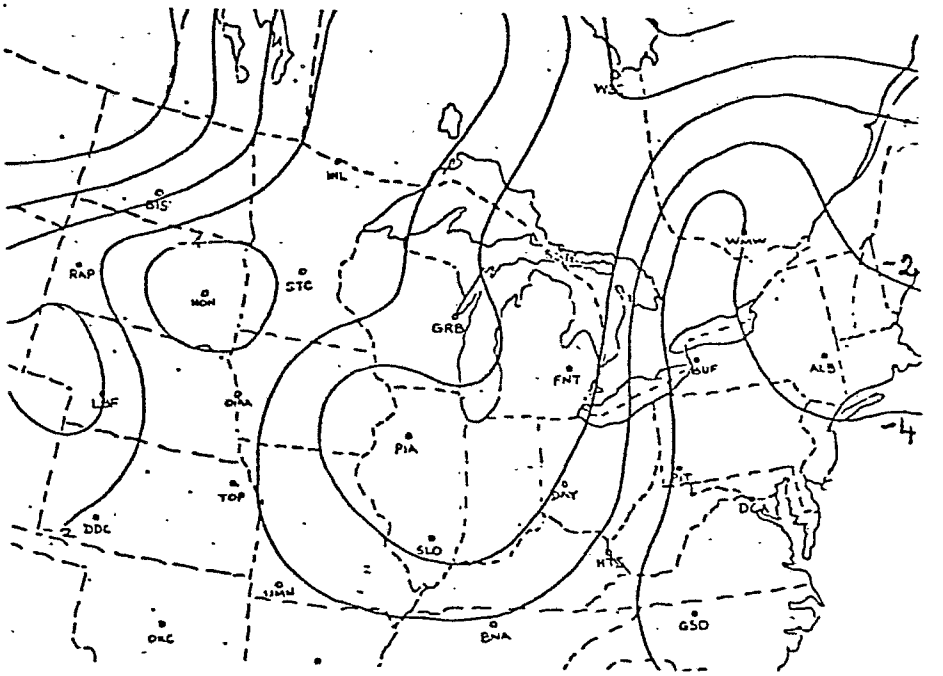
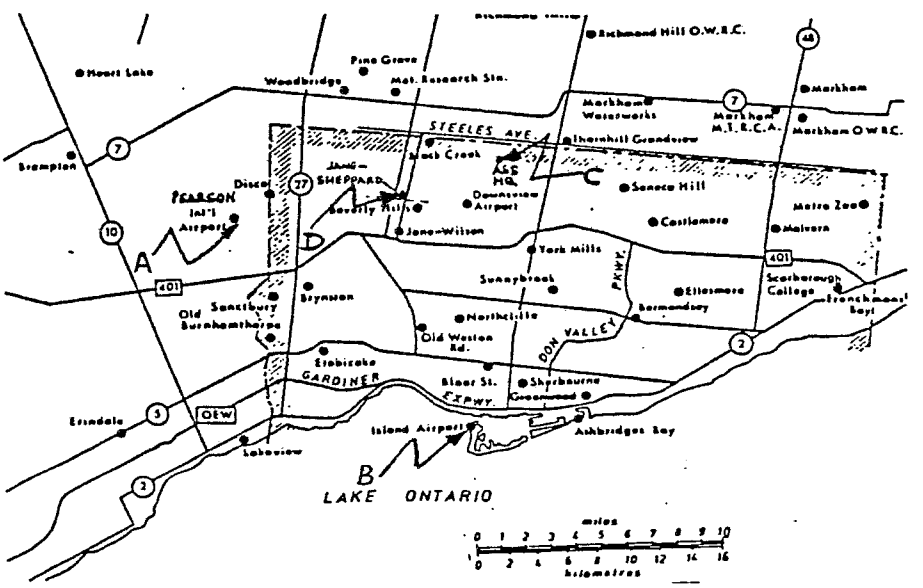


Figure 7. Toronto area map.
"A" indicates Pearson International Airport (YYZ).
"B" indicates Toronto Island Airport (YTZ).
"C" indicates AES Headquarters.
"D" indicates tornado area.



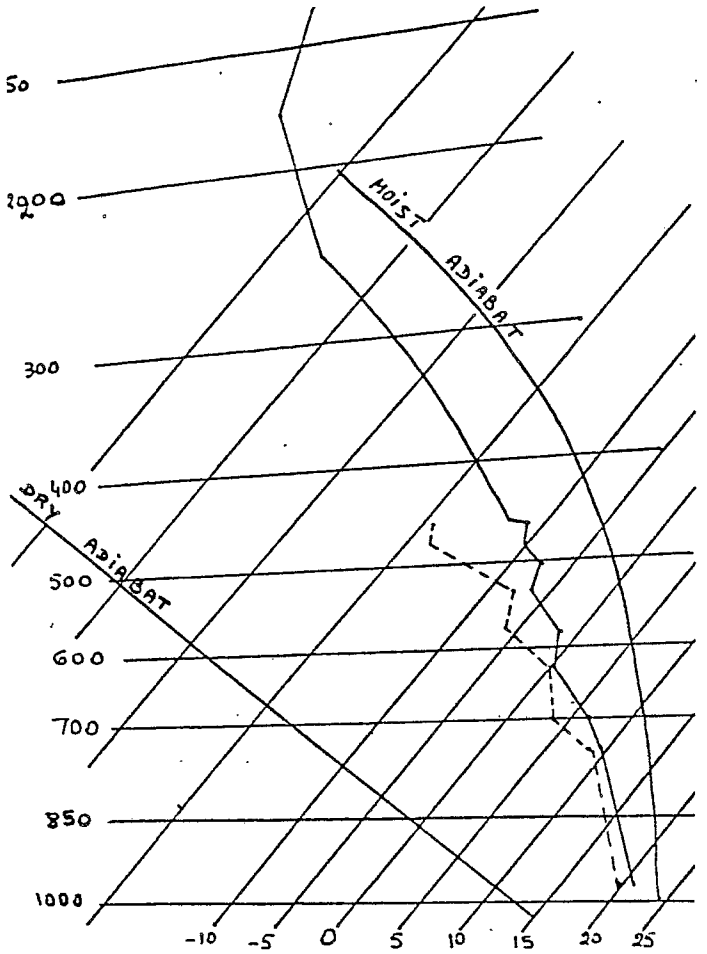


Figure 8a. Buffalo sounding.
1200GMT August 14, 1984.

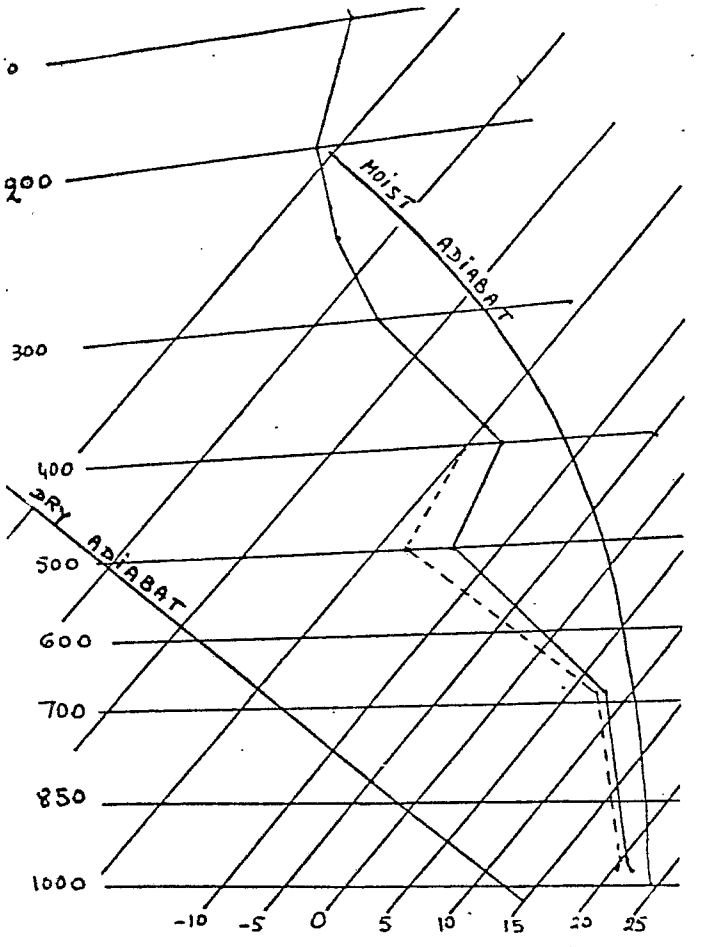


Figure 8b. Buffalo sounding.
0000GMT August 15, 1984.

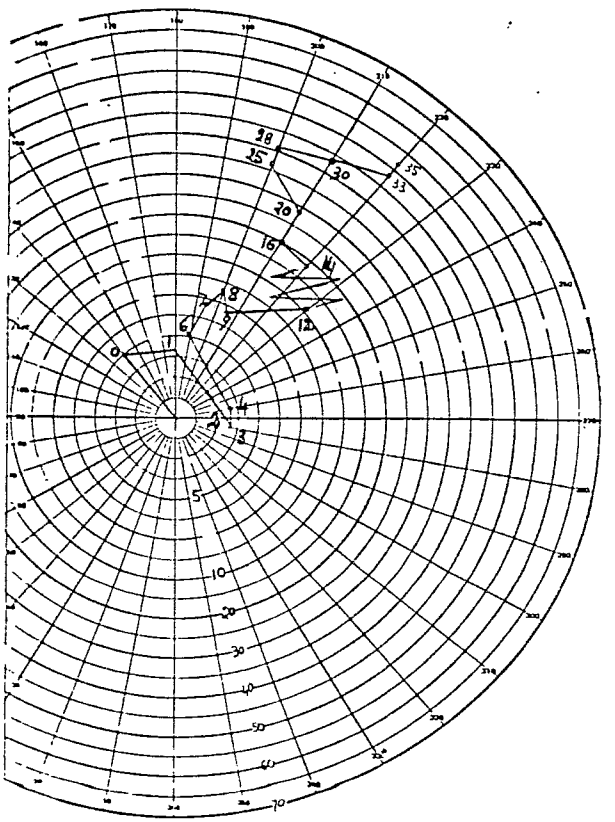


Figure 8c. Buffalo rowinsonde.
1200GMT August 14, 1984.

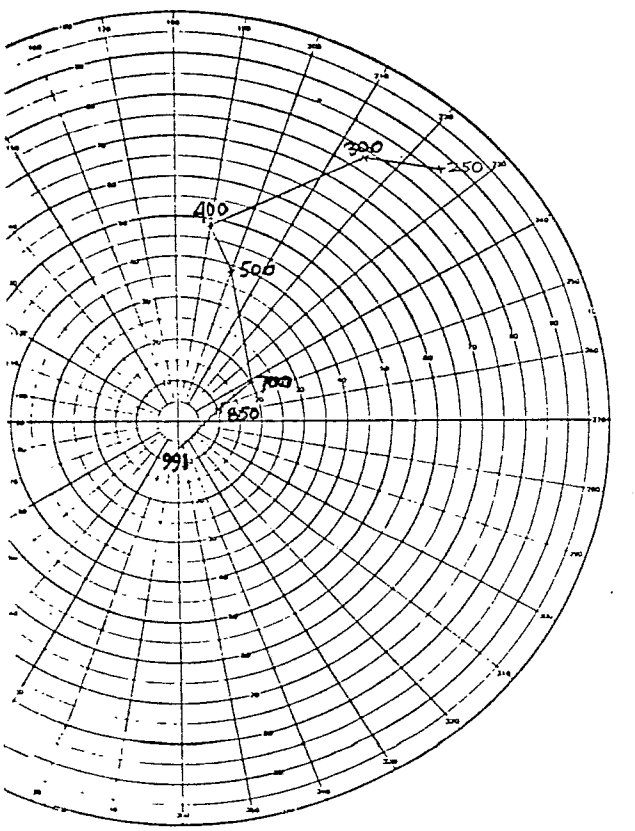


Figure 8d. Buffalo rowinsonde.
0000GMT August 15, 1984.

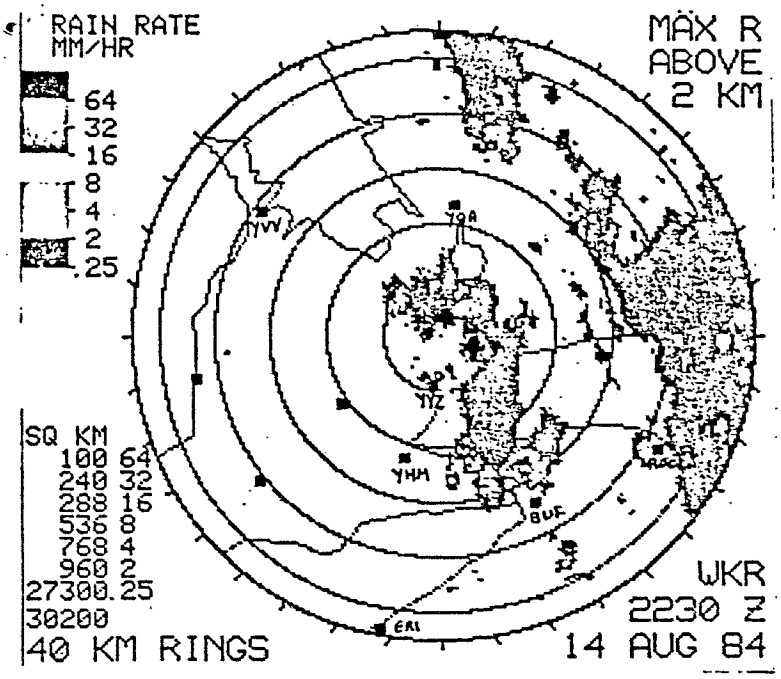


Figure 9a. Maximum rainfall rate above 2km CAPPI of the King City radar, for 2230GMT August 14, 1984.

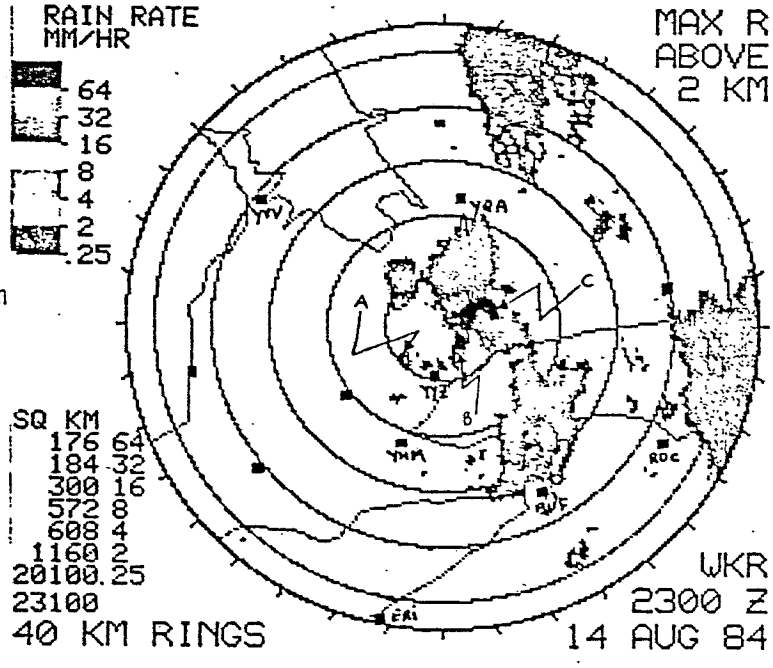


Figure 9b. Maximum rainfall rate above 2 km CAPPI of the King City radar, for 2300GMT August 14, 1984.

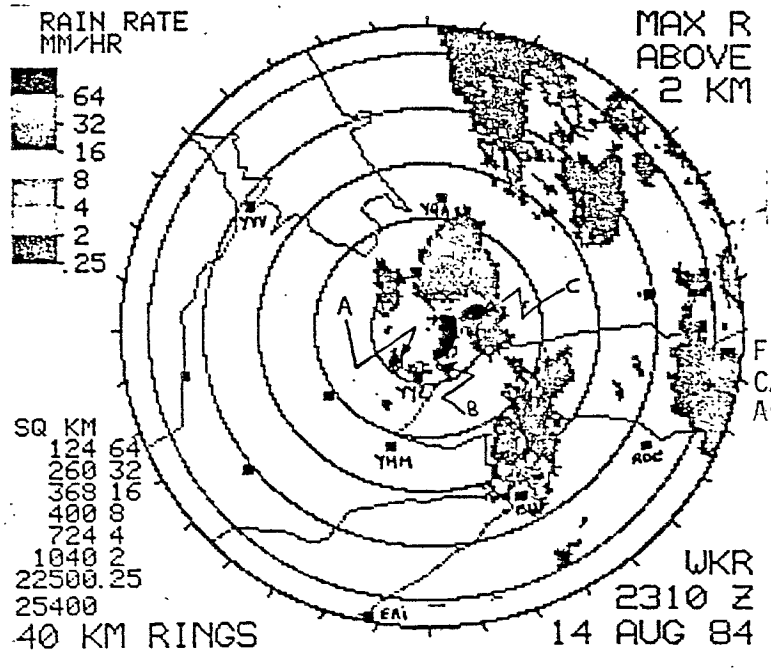


Figure 9c. maximum rainfall rate above 2 km CAPPI of the King City radar, for 2310GMT August 14, 1984.

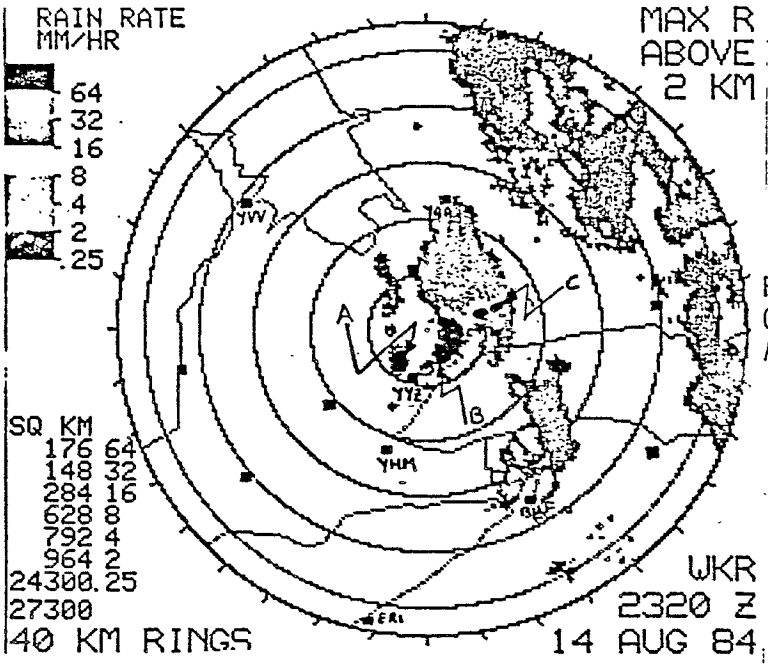


Figure 9d. Maximum rainfall rate above 2 km CAPPI of the King City radar, for 2320GMT August 14, 1984.

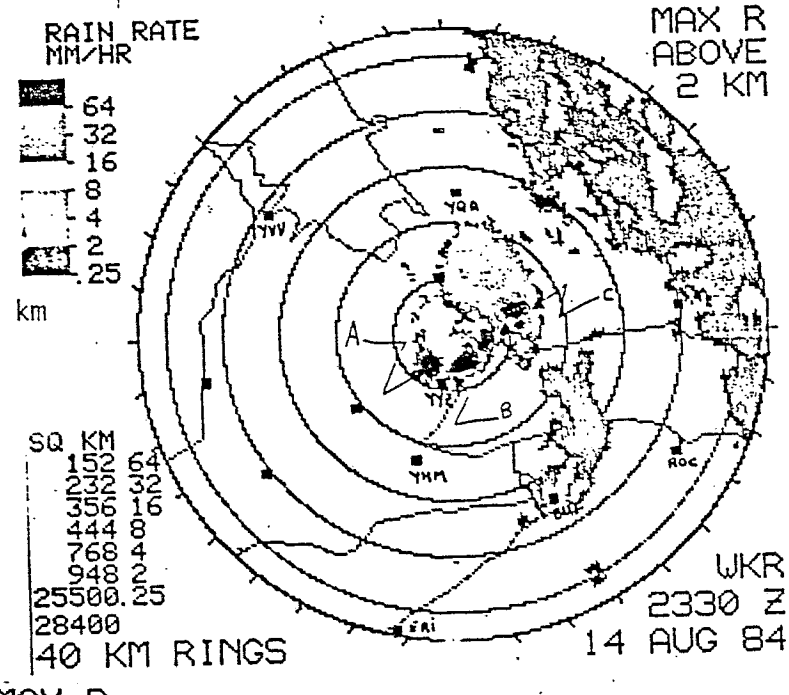


Figure 9e. Maximum rainfall rate above 2 km CAPPI of the King City radar, for 2330GMT August 14, 1984.

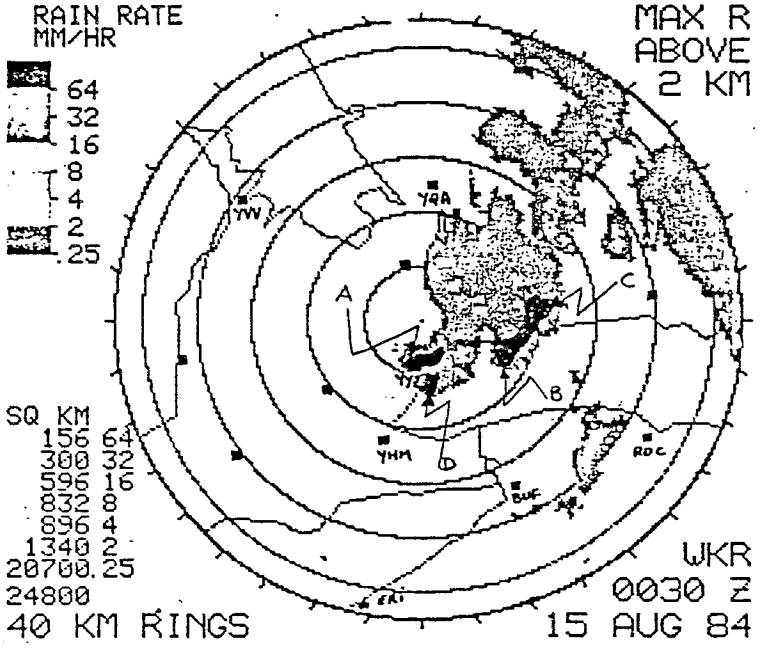


Figure 9f. Maximum rainfall rate above 2 km CAPPI of the King City radar, for 0030GMT August 15, 1984.

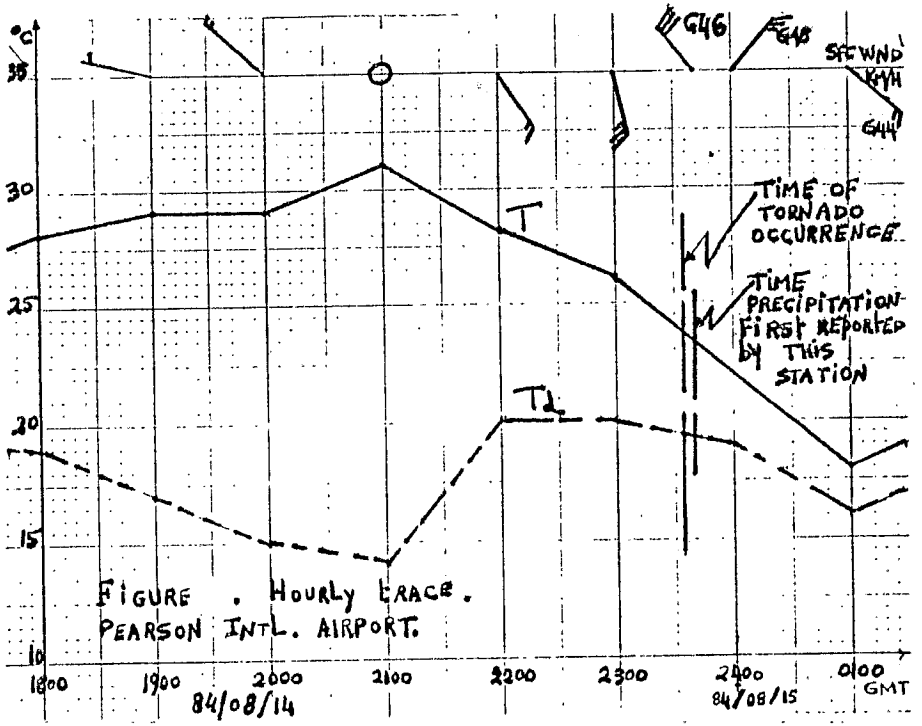


FIGURE . HOURLY TRACE.
PEARSON INTL. AIRPORT.

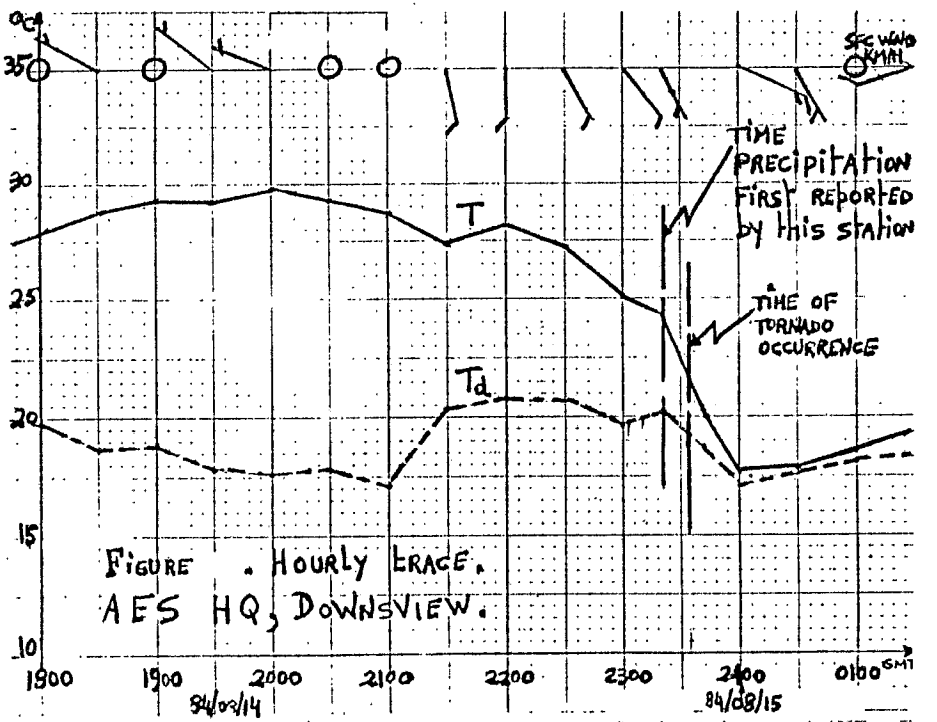


FIGURE . HOURLY TRACE.
AES HQ, DOWNSVIEW.

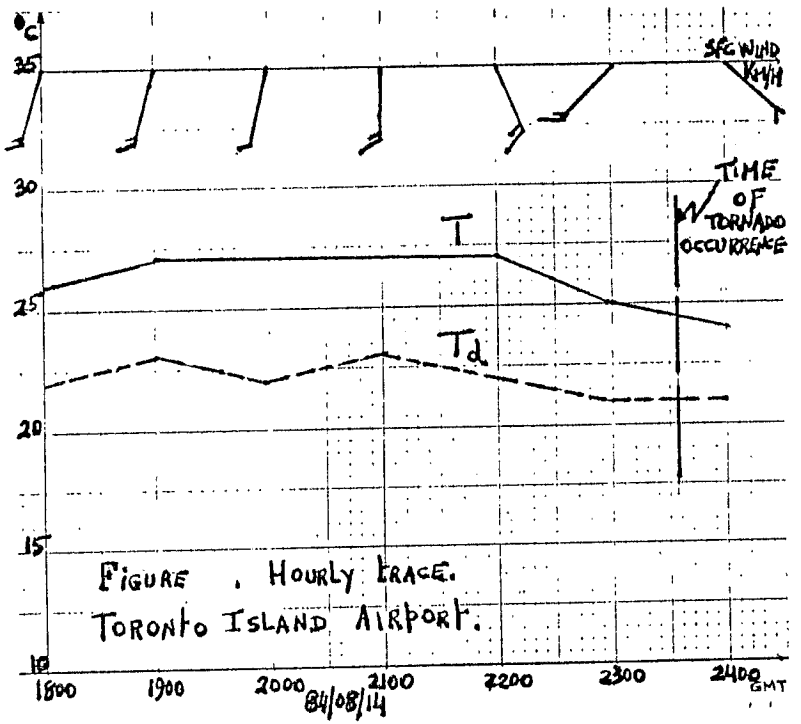


FIGURE . HOURLY TRACE.
TORONTO ISLAND AIRPORT.

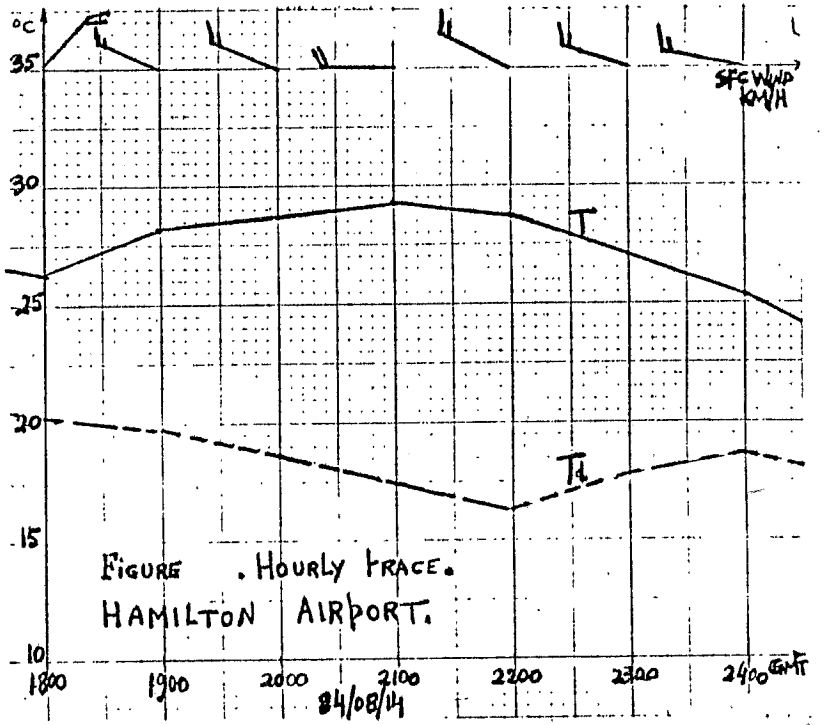


FIGURE . HOURLY TRACE.
HAMILTON AIRPORT.

Figure 11a. Mean sea level pressure analysis. 1500GMT August 14, 1984.

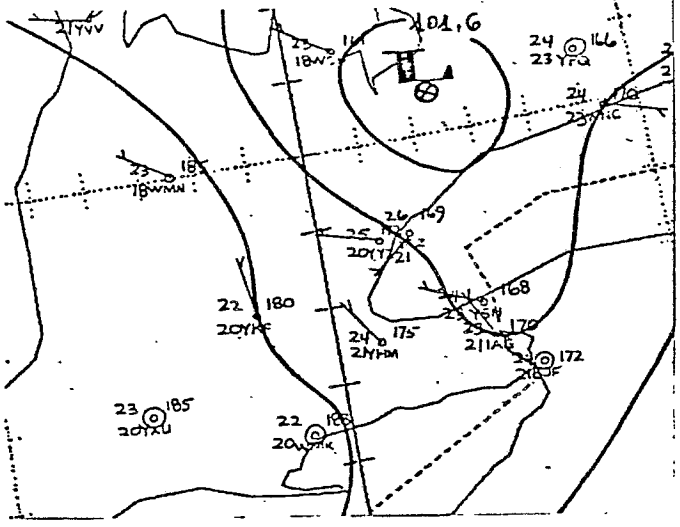


Figure 11b. Mean sea level pressure analysis. 1800GMT August 14, 1984.

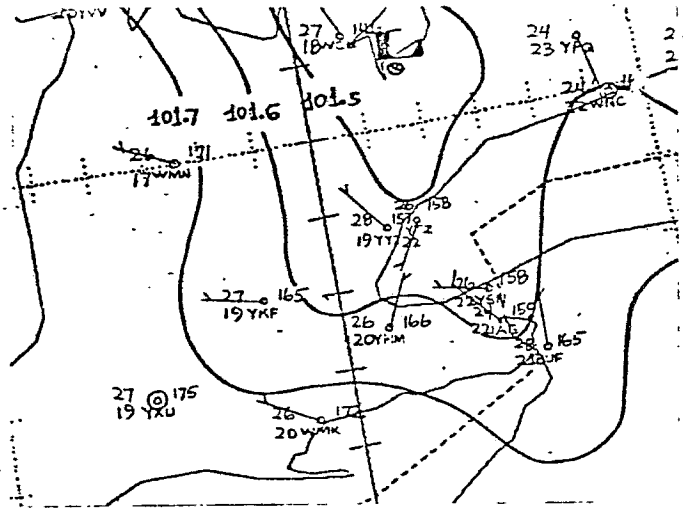


Figure 11c. Mean sea level pressure analysis. 2100GMT August 14, 1984.

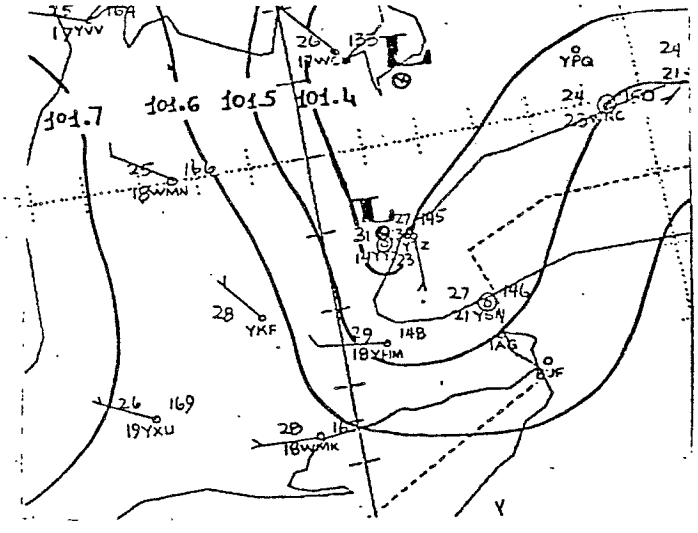


Figure 11d. Mean sea level pressure analysis. 2200GMT August 14, 1984.

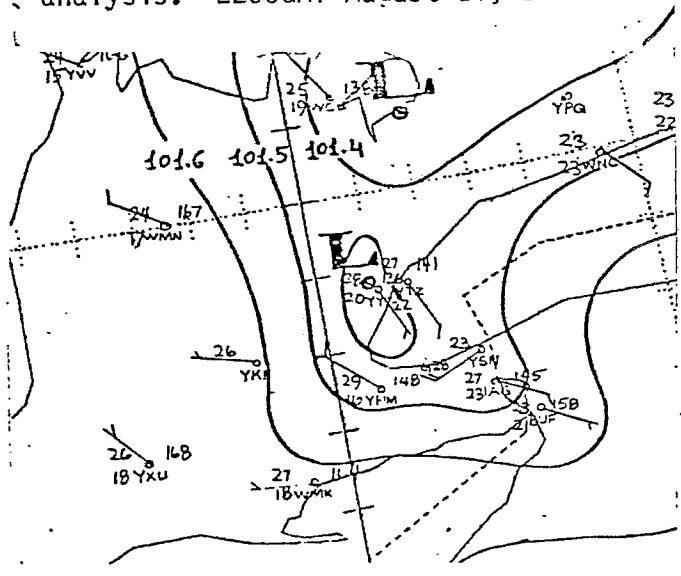


Figure 11e. Mean sea level pressure analysis. 2300GMT August 14, 1984.

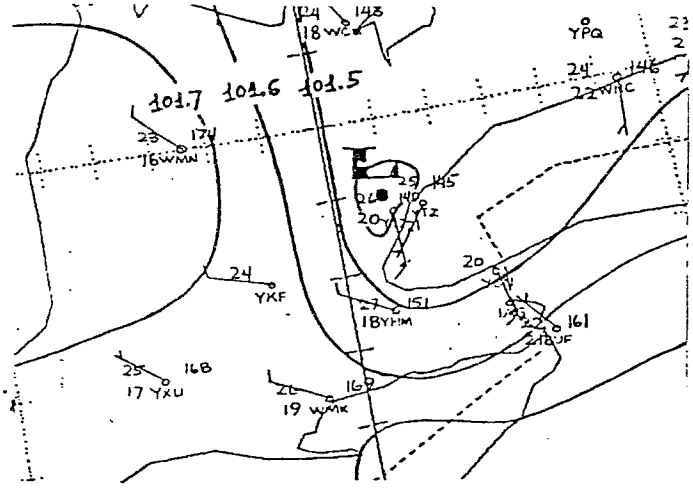
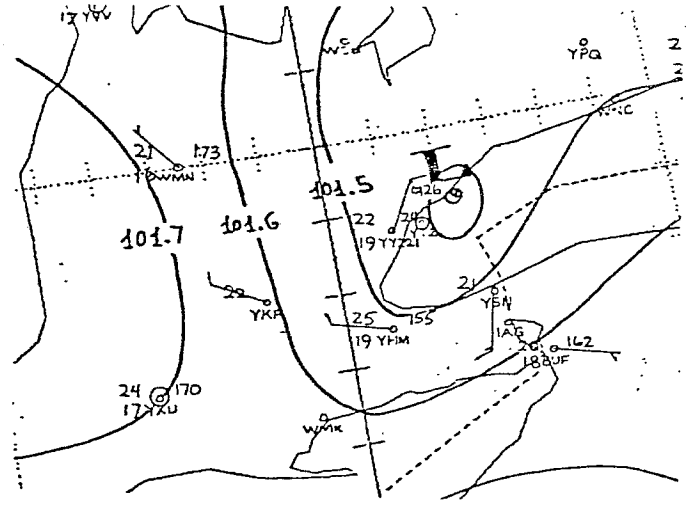


Figure 11f. Mean sea level pressure analysis. 0000GMT August 15, 1984.



The DOWNSVIEW, Ontario TORNADO of August 14, 1984

Investigation dates August 15 and 18, 1984
Investigation, photographs and report by Steven Leitch
Downsview office 667-4662

INTRODUCTION:

On the evening of August 14, 1984 at about 19:35 EDT (23:35 GMT) a tornado touched down in a Downsview residential area near Jane Street and Frith Road. It moved in a nearly straight line to a ravine east of Norfield Cr. west of Albion Road near the Humber river. It partially unroofed at least 4 homes, ripped up some of the roofs of 4 warehouses, collapsed a factory block wall and roof, damaged trees, metal garden sheds, telephone poles, power lines and cars. A heavy rainfall and large hail immediately followed the tornado breaking many precipitation records. The F1-2 tornado tracked from northeast to southwest for 4.0 km and had a path width of about 100m ± 50m. To the best of my knowledge there were no injuries or fatalities.

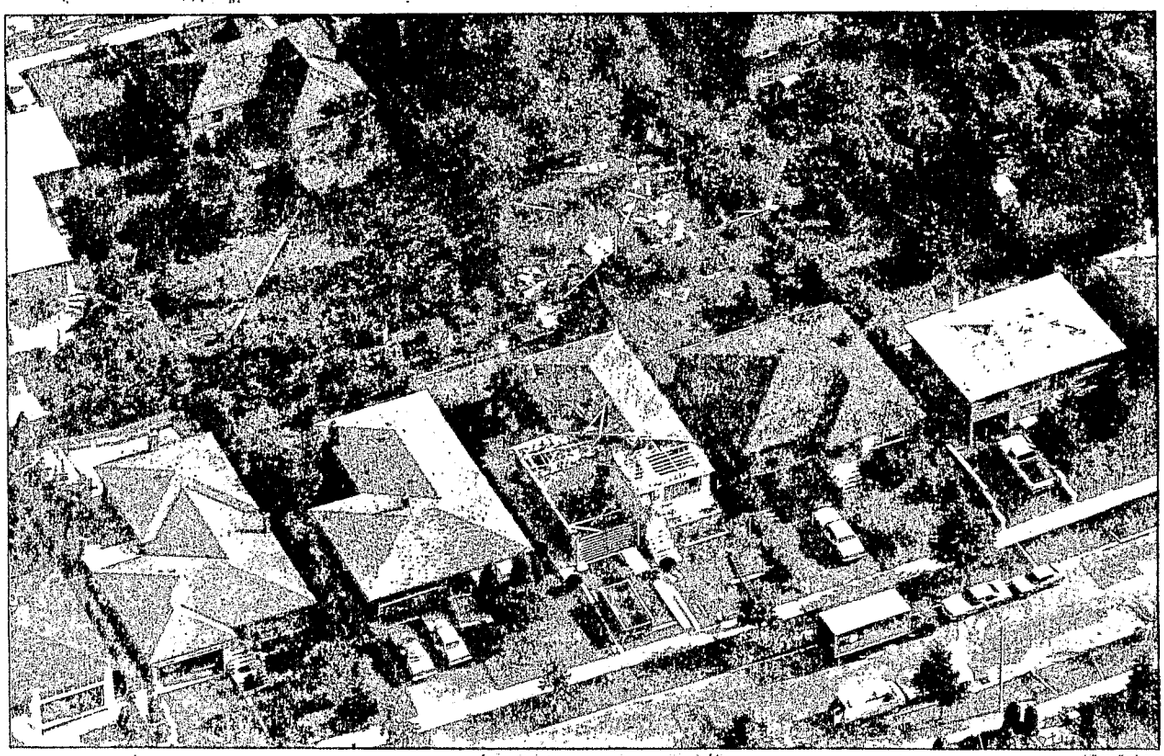
SEQUENCE OF EVENTS:

It had been sunny, warm and humid for much of the day. Late in the afternoon showers blossomed to the east of Metropolitan Toronto and convective cloud built rapidly back over the north end and to just west of the city. Shower movement was towards the northeast. At 6pm EDT the temperature was 30°C. By 7pm a friend called my attention to dark clouds passing over us from the west. I live in a high-rise apartment building near Finch Avenue and Sentinel Road, south of YORK UNIVERSITY, with a view only to the east. The heavy clouds passed overhead and moved 1 or 2 kilometres to the northeast. Watching from my balcony, for the next 20 minutes, heavy rain developed east of us and began to move closer. The clouds seemed to have stopped their northeastward movement and by 7:20 appeared to be comming back. Heavy rain was falling about 500m to the east and the rain free cloud base overhead was getting very dark. Lower cloud fragments just to the east were moving northward and, yet, the low pieces directly overhead were moving south. It appeared that this area of dark cloud just east of me and partly overhead was slowly rotating counter-clockwise (if viewed from above - looking down on the earth). Over the next 5 minutes the area of rotation became smaller, more clearly defined and was rotating a little faster. Sudden wind gusts from the north-northwest wisked leaves and paper up into the air. My wife and her brother both said that the sky and clouds were greenish; I couldn't perceive the colour, it all just looked dark to me. By about 7:30 the area of rotation was more vigorous and I estimated it was overhead Finch Avenue and Sentinel Road (about 200m east-southeast of my location).

I, then, telephoned the Ontario Weather Centre's severe weather number 676-4549 and reported a rotating wall cloud over Downsview. Within the next 5 minutes the rotating cloud base moved out of view over the right side of our building to the southwest. Heavy rain began to fall and all sight of the clouds was lost by 7:35. At about 7:35-:40 a tornado touched down 1.5 km southwest of me and continued to travel to the southwest for 4.0 km and probably lifted off at about 7:45-:50pm.

There were at least two photographs taken of the storm. One appeared in the Toronto Star and can be found at the back of this report. Another was a more distant still shot of the funnel cloud which was shown on CFTO TV that night. I don't have a copy of that.

For the track of the Tornado see the fold out maps located at the back of this report.



bill sandford, sun

DEBRIS from the roof of a Brewster Cres. home is visible in a neighboring yard in this aerial photo of the tornado-ravaged residential area.

DAMAGE LOCATIONS: (refer to the fold out maps at the back of this report for numbered locations)

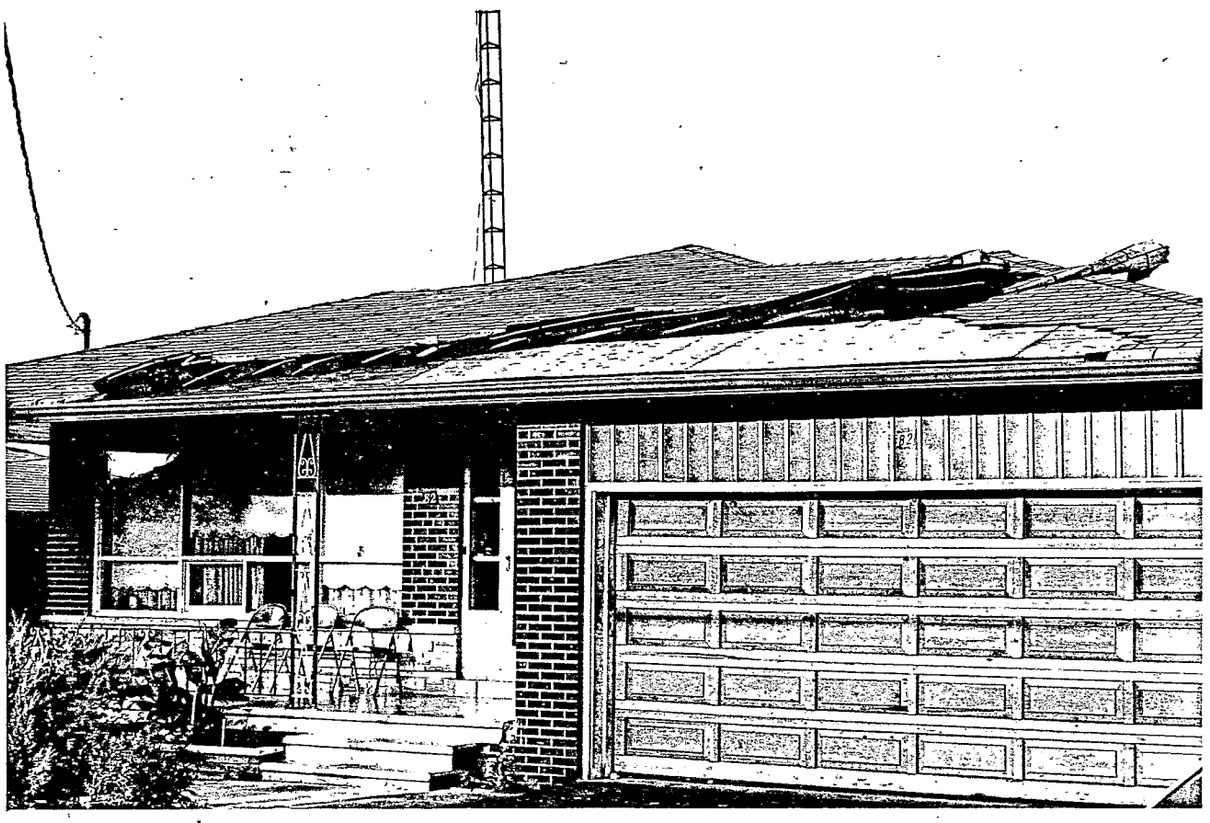
1) The location of the apartment residence of the author of this report. The larger circle indicates the estimated position and size of the rotating cloud base at about 7:30 pm EDT. Heavy rain was falling east of this location and advancing westward.

2) On the southwest corner of Jane Street and Frith Road some small bushes were uprooted and leaning to the southwest.

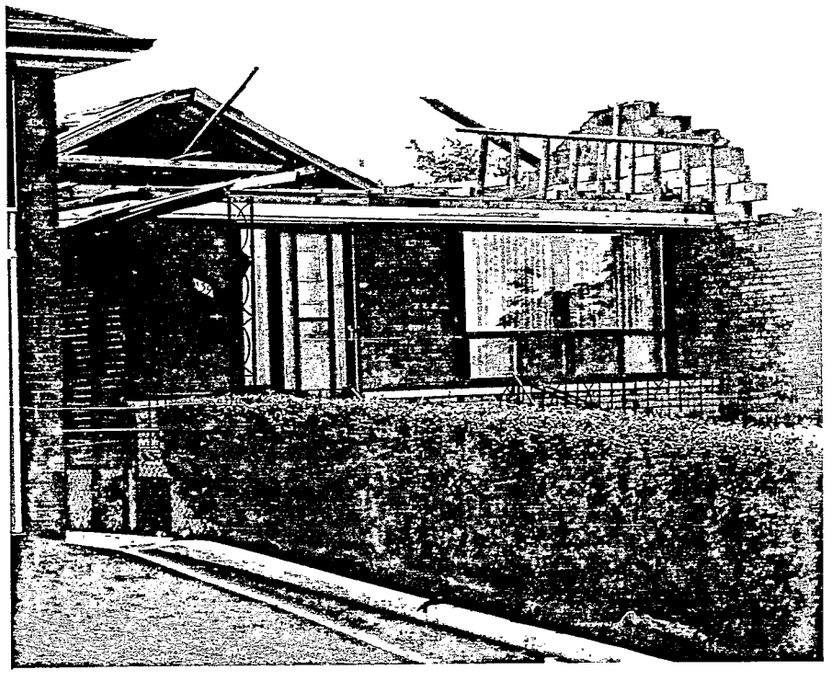
3) At 26 Ricklan Drive, on the west side of the street, the roof was removed from the southeast corner of the house. The garage which is attatched to the south side had its entire roof removed.

4) At the south corner of Ricklan Drive a medium size tree was downed to a direction of 280° mag.

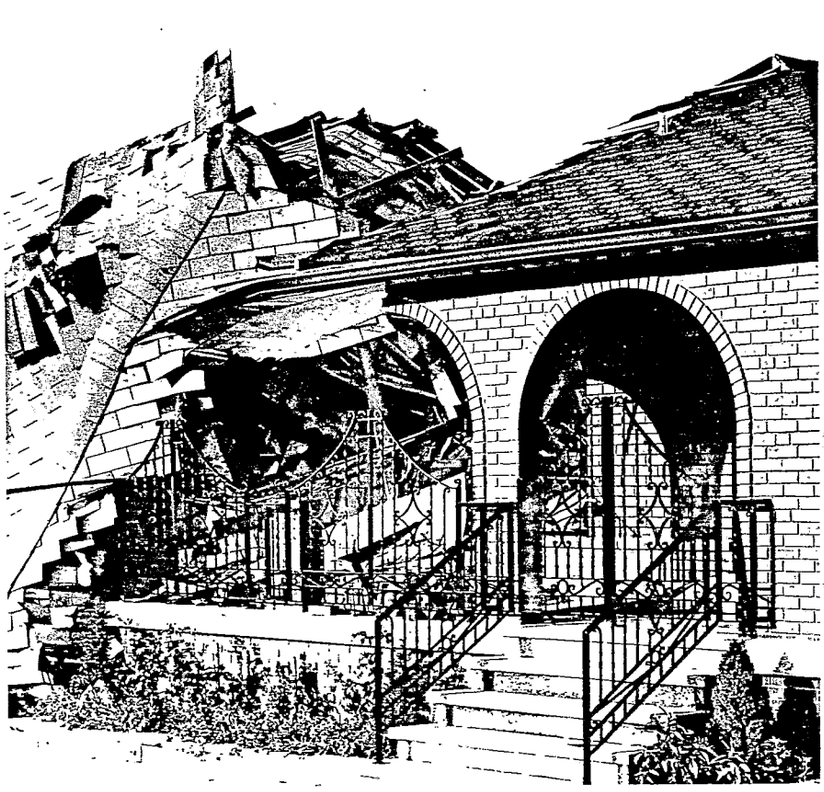
5) Half of the north facing roof of a house at 65 Brewster Cr. was blown to the southwest. All of the garage roof was also gone. (See the aerial view taken by a Toronto Sun photographer on the page opposite)



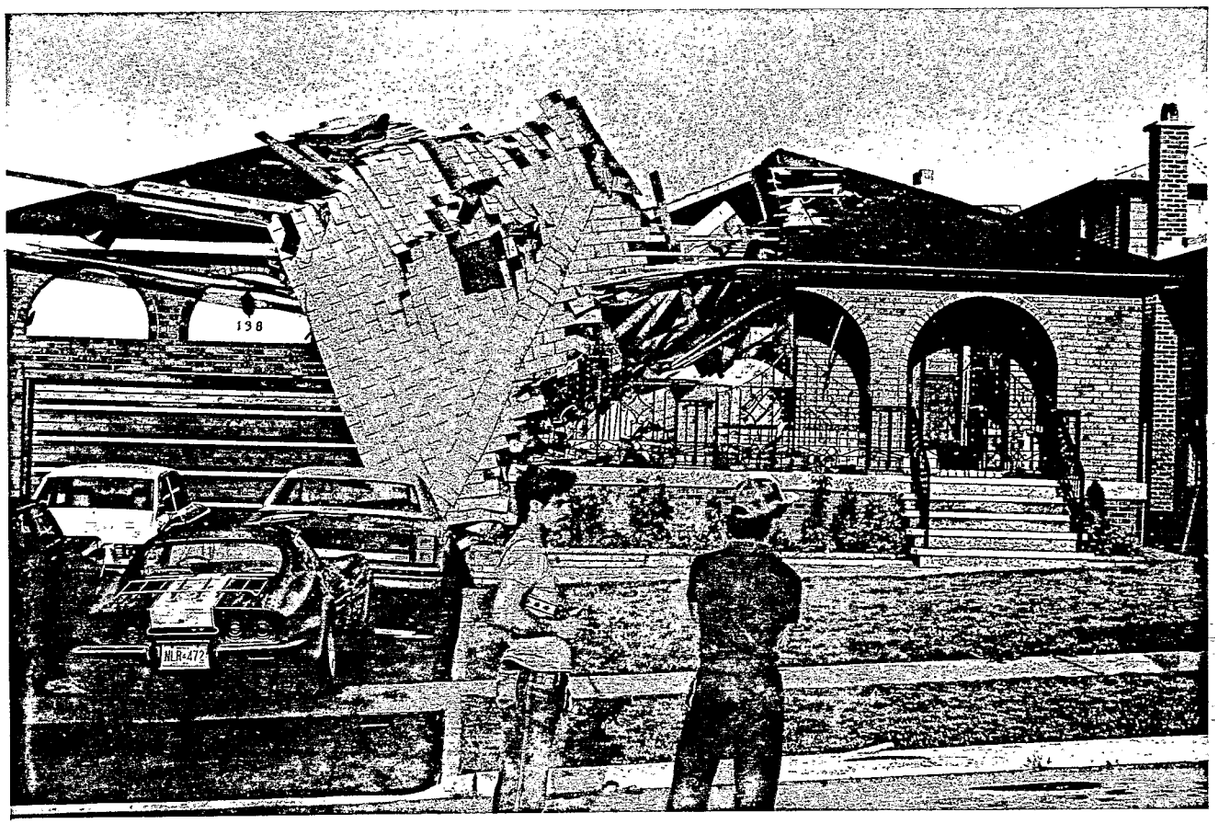
6) (ABOVE) On the west side of Laura Road at 82 Laura a layer of asphalt shingles on the east side of the house and garage was peeled back.



139 Honeywood - roof removed by storm

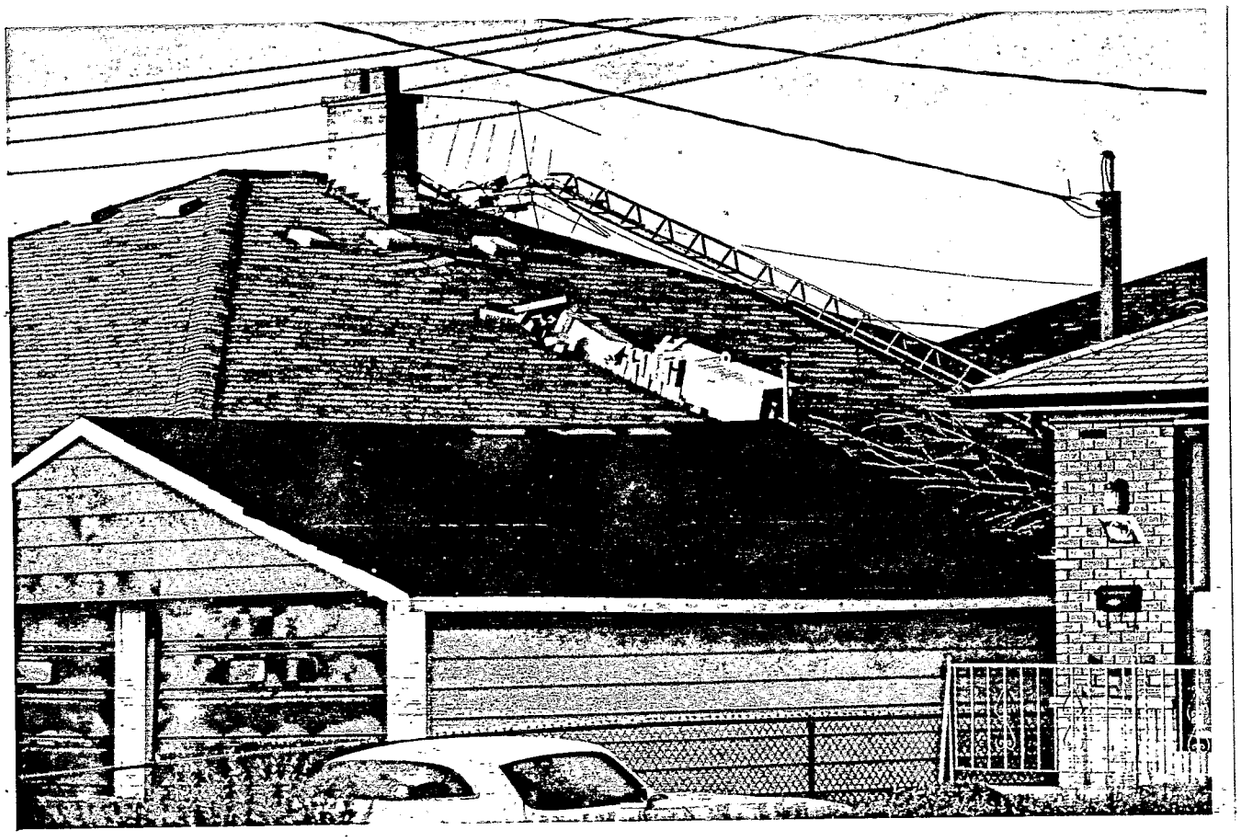


138 Honeywood - roof landed here from across road

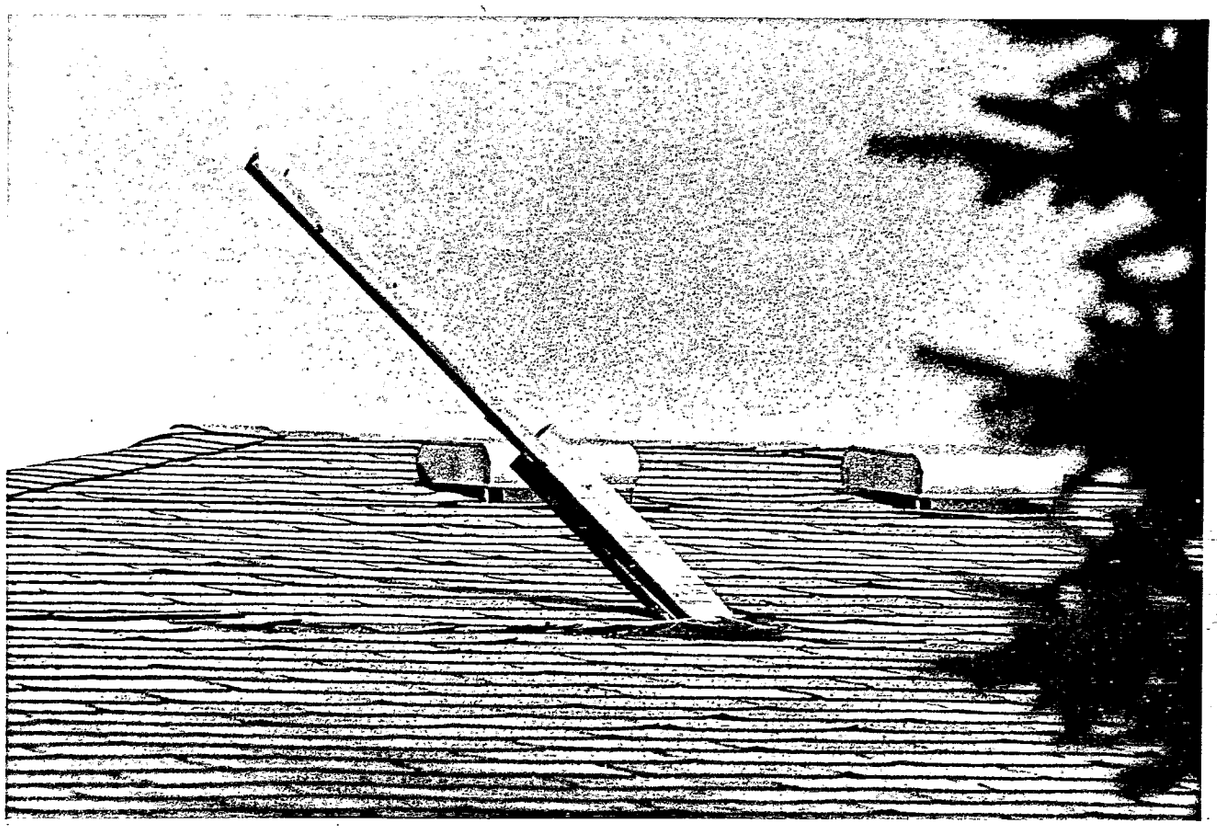


7) Honeywood Road. At 139 Honeywood, on the east side of the road, the west half of the house roof and all of the garage roof was removed and blown across the road where it crashed into the front centre of the house at 138 Honeywood. (See photos opposite and above)

(ABOVE) Some of the roofing debris was also carried south on Honeywood and strewn about the road and lawns.



Location 8) Lomar Drive. A TV tower and a brick chimney fall in opposite directions.



8) (ABOVE) A few homes on the west side of Lomar drive bounded on the west by the Honeywood loop sustained property damage. A chimney was collapsed northward, and yet, the TV tower on the same house fell to the south. (See the photo on the opposite page) A fence was also knocked over to the east and a roof was speared by a lumber missle.

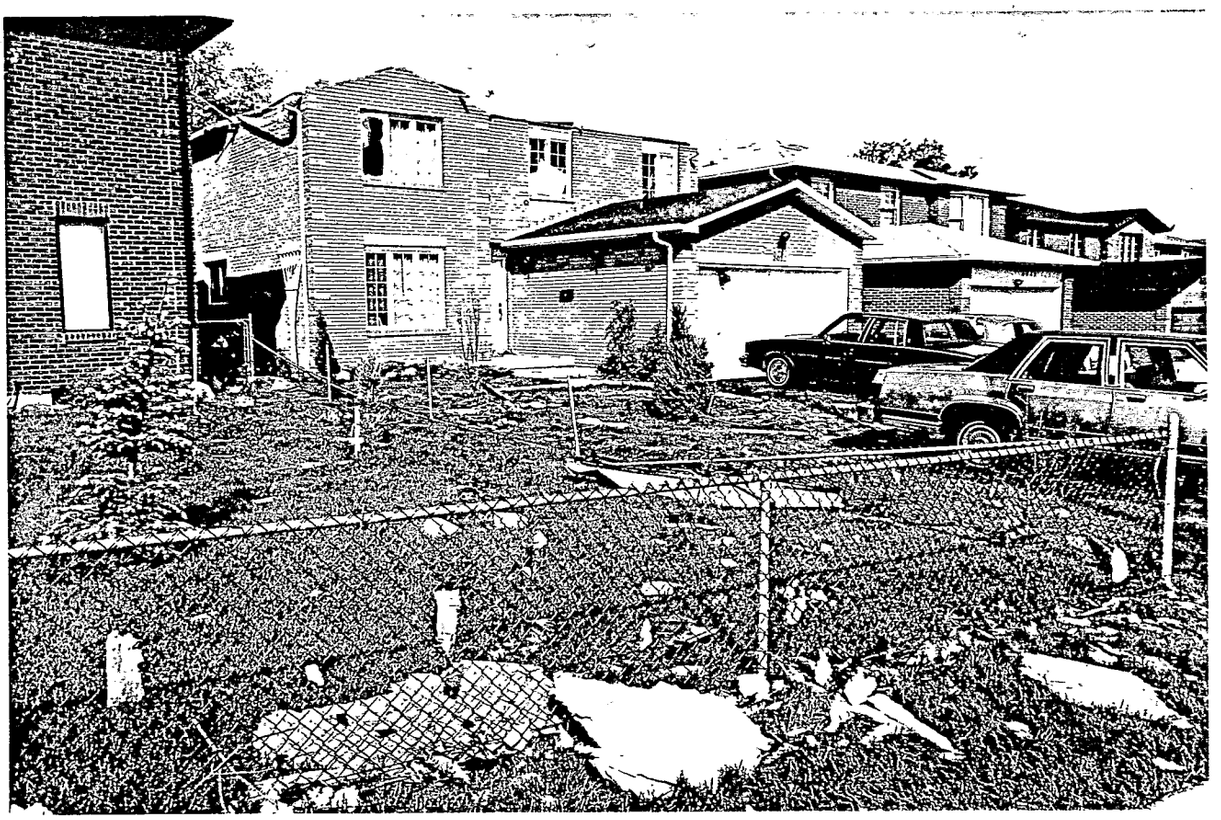
9) On Oakdale Road just north of Sheppard Avenue I found a wrecked aluminum garden shed from one of the houses to the northeast. A wooden telephone pole had been snapped off about a metre above the ground.

10) The core of the tornado track crossed highway 400 from northeast to southwest just 30m north of the centre of the Sheppard Avenue bridge. One steel light standard on the east side of the highway had been knocked down.

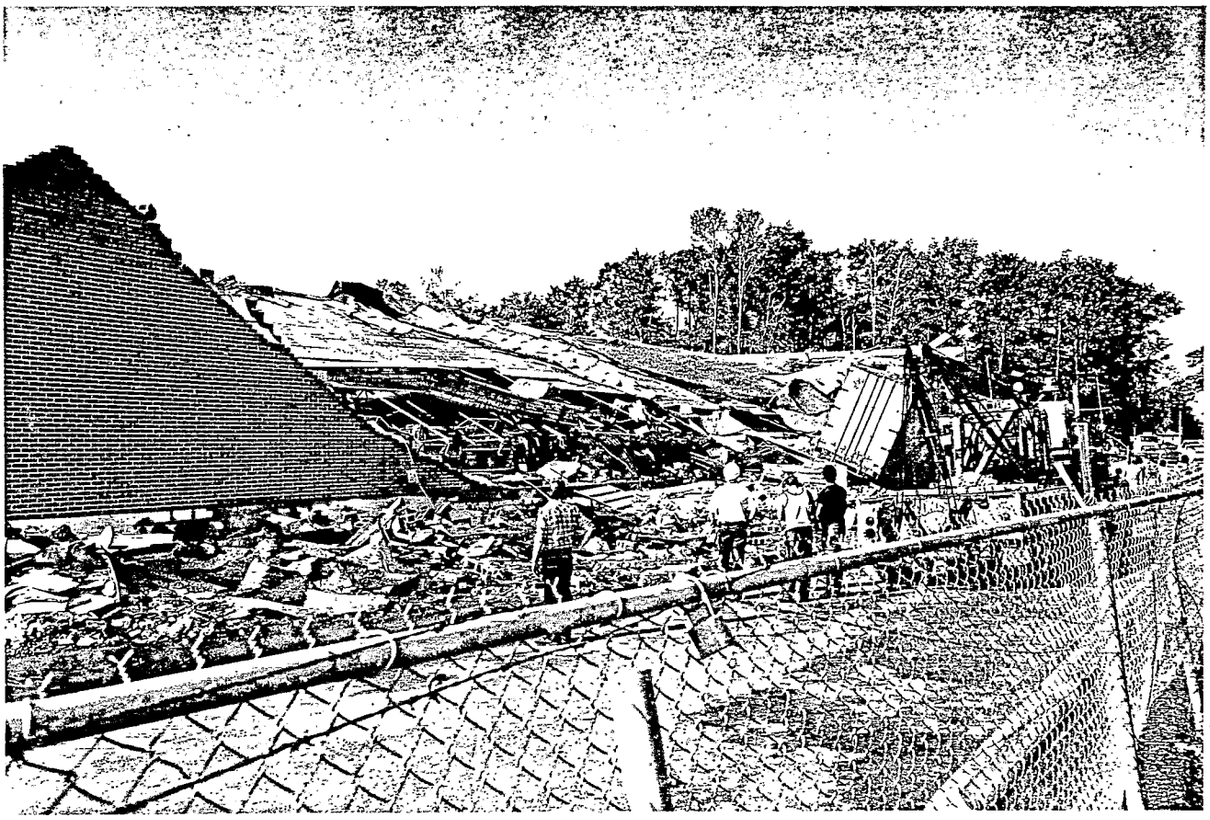
11) From the high point of the Sheppard Avenue bridge I looked southwest over the roof damage to the large Eaton's warehouse. There was a narrow line of roof damage (about 5 - 10m wide) running from northeast to southwest across this very large roof. Along the line tar, gravel and fiber board had been buckled upward, ripped off in sheets and/or blown away to the southwest side of the building. Some wood framing and boards had also been carried away.

12) On the west side of the Eaton's warehouse much of the roofing debris was strewn across a small field, a parking lot and plastered all over the east side of frost fences surrounding a transformer site and fences barricading the railway line. These fences were, now, leaning to the west. Some of the roofing debris had been carried over all of this and crashed onto another warehouse where I could see more damaged roof along the same southwest storm track. Woolco also had the south end of its warehouse roof damaged like Eaton's.

Damage to the Bedford Bedding and Upholstery Ltd
North wall of factory collapsed onto parked trailer



Part of the roof removed at 3022 Weston Road.
Fiber board, in the foreground, from the Bedford Bedding factory.



13) Bedford Bedding and Upholstery Ltd - 3035 Weston Road. The north wall composed of block and brick collapsed outward onto a parked trailer and much of the roof collapsed. A chain link fence was badly beaten by the storm and littered with fiber board roofing from this and other up-track warehouses. (See another view on the opposite page) Tree tops in the area had large limbs broken off and other large trees, in a residential back yard, had been uprooted approximately west.

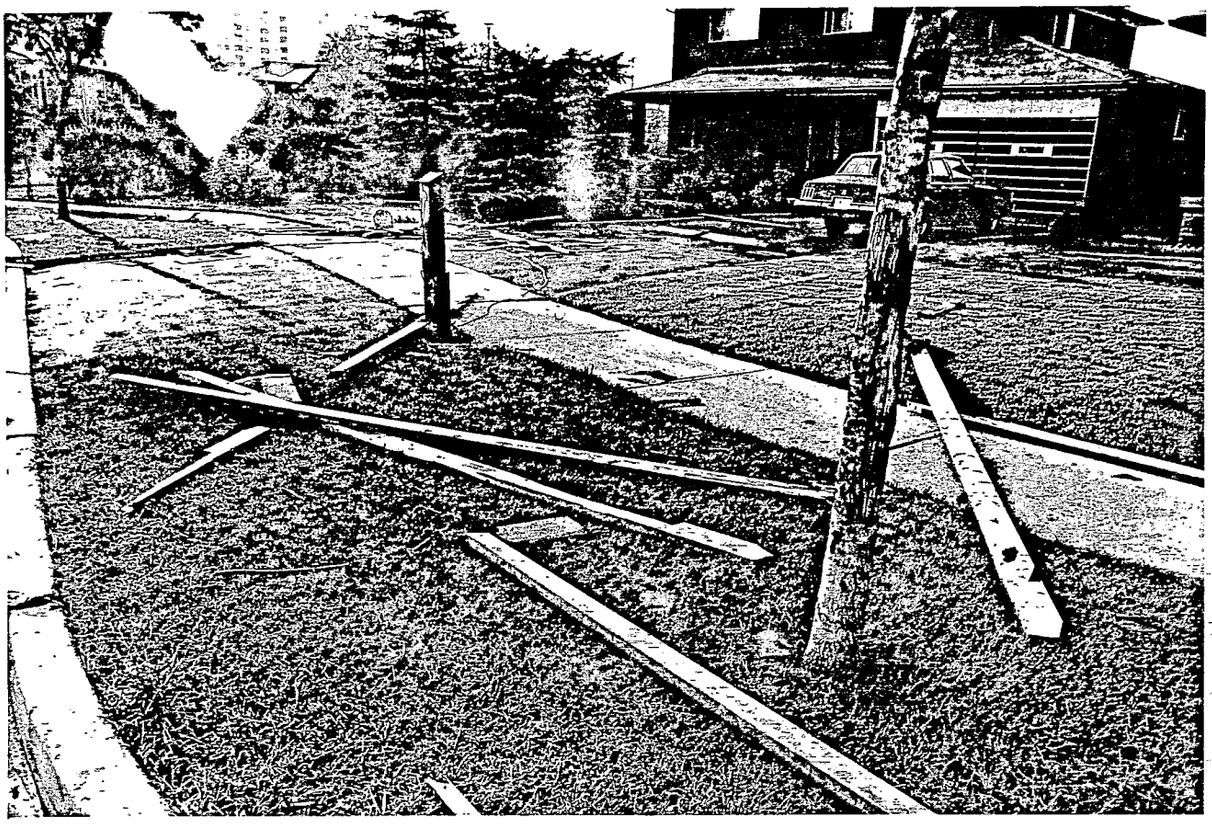
14) Weston Road at Burgundy Ct. Part of one house was unroofed at 3022 Weston Road. (See the photo on the opposite page) There was less roof damage to homes on Burgundy Court - shingles were removed and alot of debris was scattered about. I spotted a crumpled aluminum garden shed on the east side of Weston Road. I measured the F0 damage width, here, at a little more that 100m.

15) Looking southwest down into the Humber river valley I saw a narrow section of tree tops broken westward.

16) From the 21st floor of 236 Albion Road Mike Jellen photographed the funnel as it came down the Humber river valley toward him. See the Toronto Star account at the back of this report. I estimate that the funnel was at the position on the map marked X when Jellen took his photo.

17) In an isolated ravine half full of stunted trees there was a group of snapped tree tops and uprooted trees. This looks like the lift off point of the tornado. I could find no more evidence of damage any further to the southwest. I searched over to Islington Avenue.

18) Residents of a house on the inside of the southeast corner of Norfield Crescent said that they had found a piece of yellow fiber (glass) board on their roof. I guessed that this piece had come from the roofing of Woolco or Bedford Bedding over on the east side of Weston Road.



These are a couple of extra photos taken on Honeywood Road.

The negatives of most of these photos, in this report, and a few others not shown are on file with Steven Leitch.
Telephone home 661-7011
office 667-4662

CONCLUSION:

Based on the evidence presented here this was an F1 to F2 strength tornado. I feel that, in fact, the tornado was an F0 with an approximate width of 100m ± 50m, but there was a more destructive F1-2 core with an estimated width of 3-5m that produced the most noteable damage. This destructive core was probably a suction vortex circulating within the wall of the tornado. The havoc it wrecked upon property appeared more intermittent, probably dependent on whether its forward motion was added to the tornadoe's forward track or whether it was in retrograde relative to the tornadoe's southwesterly movement.

An airline pilot enroute from Buffalo to Toronto reported a huge mushroom shaped cumulonimbus top over Toronto on the evening of the storm. On radar precipitation echo movement was from southwest to northeast. The track of this tornado was in the opposite direction. It has been suggested that perhaps this whole thunderstorm, over the Toronto area, was a rotating SUPERCELL. I would guess that it was rotating counter-clockwise and the tornado occurred in the northwest quadrant producing the unusual track orientation. I could not calculate the tornadoe's speed along its track because times were not exact.

F SCALE DESCRIPTION

F0	(64 - 115 km/h) T.V. antennae bent. A few roof shingles removed from houses and roofing stripped from barns. Patches of siding removed from houses, awnings or canopies damaged. Aluminum garden sheds moved or buckled and garden furniture blown around. Fences blown down. Trees broken or uprooted (intermittently in heavily treed bush lots).
F1	(116 - 179 km/h) Large areas of roofing material stripped from homes or industrial buildings. Barn roofs entirely removed and boards or siding removed from barn walls. Some impact damage from flying missiles. Unanchored buildings twisted on their foundations. Steel hydro-electric transmission towers knocked down. Summer cottages moved off their foundation.
F2	(180 - 251 km/h) Structural failure of roofs and porches. Barns demolished to the foundation. Empty stave concrete silos blown over or the upper portions of partly filled stave silos demolished. Unanchored 1 - storey houses moved entirely off their foundation. Cottages rolled over or carried short distances. Farm wagons or equipment carried short distances. Areas of total damage in heavily treed bush lots. Considerable impact damage from flying missiles.
F3	(252 - 330 km/h) Upper storeys of brick houses destroyed. Extensive structural damage to frame houses. Heavy farm machinery and automobiles moved or upset. Unanchored 2 - storey frame houses moved entirely off their foundation. Tombstones blown over or carried short distances. House trailers entirely demolished. Extensive impact damage from flying missiles.
F4	(331 - 416 km/h) Two-storey brick homes almost completely destroyed. Empty poured concrete silos blown down. Automobiles, vans, heavy farm equipment carried long distances through the air. Extensive structural failure of industrial buildings.
F5	(417 - 509 km/h) Little remains intact.

TORONTO STAR
Wednesday
August 15, 1984
25 CENTS

MIKE JELLEN/TORONTO STAR

How this picture was taken

The most amazing thing Mike Jellen has ever seen is now the most amazing picture he's ever taken.

"It was like nothing I'd ever seen — like something out of a movie," said the 40-year-old resident of 236 Albion Rd.

He was standing on his 21st-floor balcony facing east when "I saw the formation of the tornado.

"It formed slowly; I saw it touch down somewhere between Highway 400 and Weston Rd.

"It had a gray color and looked like a continuation of the clouds. It formed downwards."

Despite his shock, Jellen had the presence of mind to dash inside for a camera and returned to the balcony to get a picture.

"I was rather afraid because it seemed to be heading directly for our building. Soon after it touched down, I saw five or six explosions, white explosions. It seemed like a big electric short. I saw it continuing up to the Humber River at which stage it sucked up some water; it was a narrow spiral. It looked 400 or 500 feet high.

"Then I saw all kinds of stuff flying through the air — dust, leaves; I was in sea storms before but it never compared to this.

"When it was getting very close to my building, I ran inside, shut the door and was hoping it wouldn't shatter the windows or worse.

"Seconds later, there was a tremendous sound, like sucking air, then it became dark and I couldn't see outside. It was all over in 15 to 20 seconds."

Eyewitness: Mike Jellen, who took the photo above, watched storm from his apartment.

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Twister slashes across northern Metro

Residents start cleanup after roofs torn off

North York residents are cleaning up today in the wake of a severe storm that tore across northwest Metro last night.

Damage could run into the millions of dollars.

The thunderstorm roared in on hail-bearing winds from the southwest at 7.50 p.m.

It caused an estimated $1 million damage to a King Koil mattress plant on Weston Rd., tore off part of the roof and shattered windows at the Eaton's retail store and warehouse near Highway 400 and Sheppard Ave. W., and ripped roofs off homes.

☐ 'I thought the world was ending,' storm victim says. Page A7

Police said four people were treated in hospital but there were no serious injuries reported. A Cranbrooke Ave. man was taken to North York Branson Hospital after being struck by lightning. He was kept there for observation and then released.

Early today Metro police were warning parents to keep their children away from rain-swollen creeks.

A Bell spokesman said there were no major disruptions in phone service in areas hit by the storm.

Work crews from North York Hydro worked through the night to restore power in affected areas, a spokesman said, and by early today power was on in most areas.

He said the sections of the city worst hit were in the Jane St. area north of Sheppard Ave. W. and there were also blackouts as far east as Bayview Ave. and as far south as Highway 401.

Trapped motorists

He said he didn't have an immediate estimate of the number of homes or businesses affected by the blackout.

The storm moved on east and by early this morning was over southern Quebec but its power was spent, said an Environment Canada spokesman.

"We had some heavy rains that lasted about 10 minutes but then the skies cleared," said a spokesman for the Ontario Provincial Police in Kingston.

He said the storm passed over the Kingston area about 10.30 p.m. but didn't cause any damage.

After the storm hit, police and fire crews called for help from other divisions as more than 100 calls lit up their switchboard. The

See TWISTER/page A4

Continued from page A1

winds and rain also blacked out traffic signals and trapped motorists in their cars.

Several hours after the storm, dazed homeowners in North York still wandered their streets looking at damage where the twister hit. The scattered wreckage made some streets look like war zones.

Steve Burman of St. John Ambulance stood in front of a wrecked bus stop, which had been ripped apart and thrown about 18 metres (60 feet), and said: "My God, if this had been during the rush hour a few hours sooner, hundreds would have been killed."

The damage centred on Sheppard Ave. W. and Highway 400. Eaton's is on the southwest corner, while Bedford Bedding and Upholstery Ltd., the King Koil plant, is about a kilometre to the west.

The roof of a Brewster Crescent house was ripped off just over a kilometre to the northeast. Inside the house at 65 Brewster, Nick Accardo was in the shower. His sons, Richard, 6, and Jack, 10, and three guests were watching television. His wife, Vera, was in the back yard preparing a barbecue dinner.

No one hurt

Across the street, Anna Billio of 66 Brewster Crescent in North York heard the wind and went to her front door. Just as she opened it, she looked across the street "and the whole roof just left."

Her husband, Bruno Billio, 50, pulled four members of the Accardo family from their wrecked home.

"Nobody was hurt. It was a miracle," Billio said.

Two of the guests suffered minor injuries. The roofless home flooded with rain. Family members huddled in the basement as the roof was flung into the backyard.

John Stepan, a 47-year-old security guard at the Eaton's warehouse, saw the twister moving in: "I looked at a big, black upside-down funnel coming right at me."

Stepan said he saw the funnel coming along Sheppard Ave., "black as coal and moving very slowly.

"It must have taken 20 minutes from the time I saw it until it hit here."

Trevor Sunderland, 25, of Jane St., said he saw the funnel from the balcony of his apartment building at the corner of Steeles Ave. W.

"The funnel came out of a dark cloud and it seemed to be just standing for about three to four minutes. Then it got wider at the base and disappeared as it started to rain," he said.

"I never thought I would see one here in Toronto. I guess it was sort of scary, especially when it got dark outside and started to rain."

There was no warning of the storm from Environment Canada until 6 p.m., when it issued a severe thunderstorm warning for northern Niagara Region and the adjacent waters of Lake Erie.

It said radar indicated an intense thunderstorm moving slowly northeastward, with large hail and heavy downpours. Environment Canada issued its standard warning: "Remember . . . some severe thunderstorms produce tornadoes."

Environment Canada said the Niagara storm was intense but moving so slowly it couldn't be sure of its direction. This was about 20 minutes after Star reporter Frances Kelly said her car had been stopped by large hailstones at Beamsville, between St. Catharines and Hamilton.

Damage in Vaughan

The storm forced New Democratic Party leader Ed Broadbent's campaign plane to be rerouted to Ottawa.

High winds blew over a tree on Highway 2 west of the village of Newcastle and on to the roof of a passing car, slightly injuring the driver and a passenger, said a spokesman for the Ontario Provincial Police in Newcastle.

A second car then rammed into the back of the car that was hit by the tree but there were no injuries to the passengers in the second car, he said.

A spokesman for Durham Regional police said there were power blackouts in areas of Ajax.

High winds damaged the roofs of several homes in Vaughan, a spokesman for York Regional Police said.

He said there were no reports of injuries and said a damage estimate wouldn't be available until later today.

☐ This story was written by Jim Lewis with reports from Paula Todd, Frances Kelly, Peter Cheney, Sterling Taylor and Nicholas Pron.

Storm victim thought 'world was ending'

By Paula Todd Toronto Star

Shaken and forlorn-looking, Lucy Pennacchio, 21, stared at her roof — stuck on the house across the street.

"I thought the world was ending," said Pennacchio, whose home at 139 Honeywood Rd. was ravaged by the storm.

"Three-quarters of the roof is gone, there's a huge hole in the kitchen roof, everything's soaking and all the furniture is ruined."

Her mother, Filomena, 44, kept her back to the destruction. "I don't want to look. I don't want to think about it."

One of their cars was trapped under the garage door, which buckled, and debris from the roof and walls lay strewn on the driveway.

Across the street at 138 Honeywood, Nino Savoiardo, 26, told of how he hid from flying steel and wood under the family picnic table.

"I saw it coming, twisting around across the street. It peeled the roof right off that house and flung it over here."

The roof of his house is gone, the basement ceiling sagging with water. "The insulation blew all over the house. There was a huge mist and everything was flying around in the house."

Escaped harm

His mother Anna was taken to hospital with back injuries, but the rest of the five family members in or near the house when the storm struck escaped harm.

A few blocks away on Laura Rd., Sal Beltrano was still dazed hours after the storm whirled out of the neighborhood.

"I saw a washing machine fly down the street. I was in the garage when I saw the tornado coming. I slammed the garage door, but the whole building was vibrating."

On Brewster Crescent, neighbors Sam Ferrito, Joe and Bruno Billio comforted Nick Accardo, 37, whose house was destroyed.

"I was just getting into the shower when I heard my wife outside screaming for the children. She was flattened against the wall."

There's nothing much left of the Accardo home at 65 Brewster Crescent. The front window looks like it was kicked in by a giant and the roof, torn apart as it were paper, is scattered throughout the neighborhood.

Minor injuries

No one was seriously injured, although Scarborough guests Sam and Lina Damanio were treated and released from York-Finch Hospital. Sam received seven stitches for a cut above the knee and Lina was treated for a minor head injury.

Down the street at 48 Brewster Crescent, a six-metre (20-foot) maple tree was pulled from its socket, the roots and split wood sprayed across the lawn.

"I saw this thing, like a huge force or a spirit whip around the corner of the house and pull the tree right out of the ground." said Mary-Lynne Meschino, 30.

"It was like an animal," said Meschino, whose home is now missing about a quarter of its roof. Thick fragments of cement planters clutter the front sidewalk where they exploded from the force.

Storm wasn't tornado weather office says

Although many people said otherwise, Environment Canada insisted last night that the storm was not a tornado but a severe thunderstorm that produced a funnel cloud in the northwest corner of Metro.

A supervisor at the weather office said the cloud was reported by a trained weather watcher, but was not seen to touch the ground, which would have resulted in it being classified as a tornado.

Others say otherwise.

"It formed slowly. I saw it touch down somewhere between Highway 400 and Weston Rd., said Mike Jellen, 40, of Albion Rd., who took a picture of it from his 21st-floor balcony facing east.

The weather office said winds at the airport were measured at about 59 kilometres (37 miles) an hour but it would not have a report on the amount of rainfall until this morning.

Mattress plant damage 'in millions'

Tornado damage to the King Koil mattress plant will "run into the millions," owner Erving Erlick said today as he surveyed the shattered building on Weston Rd. in North York.

But there was still so much debris lying around that he had not even been able to get inside to see whether anything salvageable was left.

"We're just cleaning up what we can, that's all we can do now," Erlick said as he issued gloves and shovels to employees who showed up for work this morning to find their jobs gone with the wind.

Roof ripped off

Many of them pitched in to help clean up the mess so construction workers could start rebuilding.

Erlick said it appeared that more than half the roof on the 300,000-square-foot building had been ripped off and just about every window smashed. Several sections of wall — one more than 60 metres long — had been blown down.

A large King Koil tractor-trailer which had been parked beside the building was leaning at a crazy angle and workers were warned to keep away from it because it might fall.

Many trees in a stand of large maples were twisted and broken off.

"They're big, strong trees and they were just twisted like little sticks," said Hector Riley, an employee for 16 years.

When the twister struck about 8 p.m. mattress materials and upholstery stuffing were flung all around the neighborhood. Two large air-conditioning units were blown of the roof of the one-storey brick building.

"The roof just opened up. It was just like a can opener came through," said Jim Edgar, a former foreman at the factory. "It just bounced up and over the trees."

Just renovated

Erlick said the exterior of his factory had just been renovated. New fencing was ripped out and scattered around the grounds.

The wind also tore parts of the roof off Eaton's warehouse store at Sheppard Ave. W. and Highway 400 and shattered three plate-glass windows as 100 shoppers and employees watched in amazement. No one was injured.

"It scared the hell out of me," said Keith Lajeunesse, 26, a materials handler at the warehouse.

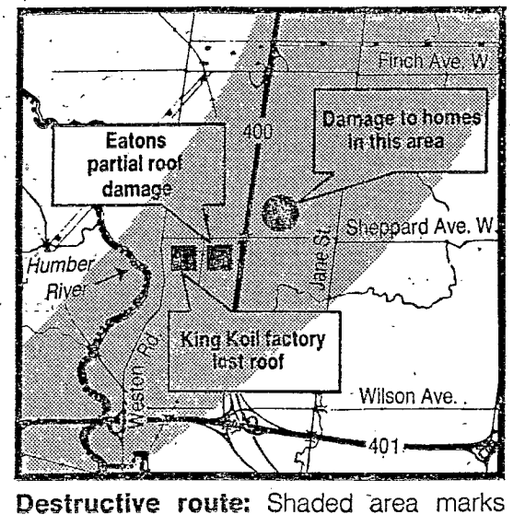
Phyllis Cornish of Weston Rd., who lives near the Eaton's store, pointed out where her swimming pool used to be. Now two 15-metre (50-foot) willow trees rest on the destroyed above-ground structure. "Thank God it missed our house," she said."

Cornish said she heard a loud noise shortly before 8 o'clock.

"We were looking out the window and Eaton's roof was just flying through the air.'

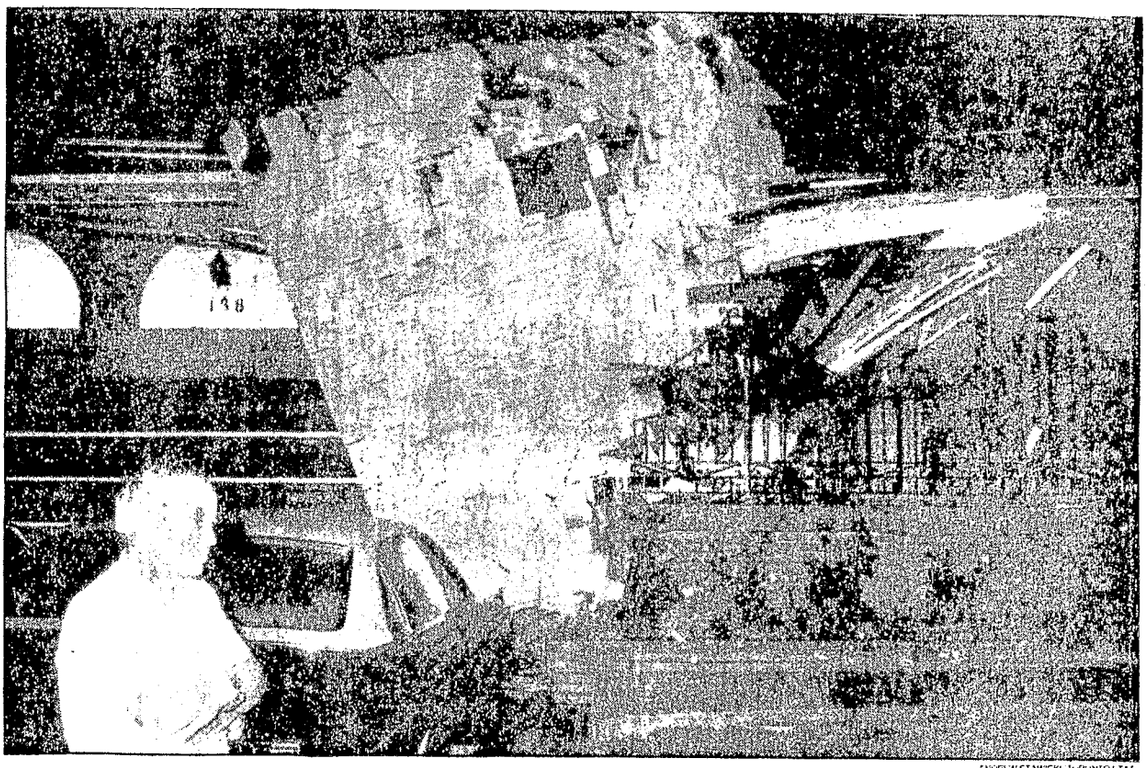
A bus shelter that stood about 30 metres (100 yards) away from the Eaton's store was blown through the air and landed on a car in the Eaton's parking lot. At least 10 parked cars had shattered windows and dented bodies after the storm passed.

Eaton's store manager Jim Matthews said the damage was still being assessed last night. He added that there was water damage to the nearby distribution centre, and some merchandise.



Destructive route: Shaded area marks the path last night's storm followed through North York, causing extensive damage.

Storm victim thought 'world was ending'



ANDRZEJ STAWICKI TORONTO STAR

Nature's fury: Frank Savoiardo, above, wasn't hurt but his home was heavily damaged in last night's storm when part of the roof from a house across the street was hurled into his residence on Honeywood Rd. His son Nino hid from the flying steel and wood under the family picnic table. Other homes in the area had roofs ripped off and one on Brewster Crescent was destroyed. Trees were uprooted and even a washing machine was seen flying down the street.

GRANT MACKINNON TORONTO STAR

Business hit: Allen Snow, an employee at the Bedford Bedding and Upholstery Ltd. plant, surveys the damage at the Weston Rd. factory hit by last night's high winds, which destroyed part of the building, ripped the roof off and demolished several cars and trucks in the parking lot. Not far away the roof was torn off an Eaton's warehouse store and shattered plate glass windows while startled shoppers and employees watched.

... THE DAY AFTER

By DAVID OVED and MARK STEWART
Staff Writers

Everything is under control in twister-tossed North York, says Mayor Mel Lastman.

"I've been out to see the homes that had their roofs torn off, and the insurance companies are looking after everything very well," he said yesterday.

At least 15 damaged homes are being repaired and emergency accommodations found for those families with the hardest-hit houses, he said.

It doesn't appear there will be a need to appeal to Queen's Park or Ottawa for special clean-up aid, said Lastman.

"It's not what you'd call a disaster area," he said.

The violent electrical storm and funnel cloud caused very little damage to public property, said North York deputy public works commissioner John Marlow. Although 58 homeowners requested city crews be dispatched to pump their flooded basements, the water had drained from all of them before the crews arrived, said Marlow.

North York Hydro had five crews out all night reconnecting individual houses to the power grid and repairing damage to several high-voltage lines, said Hydro general manager Don McKee.

"Everything is back to normal now," McKee said.

Lastman aide Gord Venner said, "We get more calls when there's a bad snowstorm."

Tuesday's tornado touched down first on Brewster Cres. and Bartel Dr. but four bounces later, it had caused millions of dollars in damage.

The nightmare began about 7:30 p.m. as hot, humid air built to the critical level needed to produce the thunderstorms that Environment Canada had warned could spark a tornado.

Environment Canada weather forecaster Luigi Bertolone said he thought there may have been more than one funnel. "The main funnel had multiple touchdowns," Bertolone said, "but I have seen a touchdown which did damage to another house which is completely off the track."

He estimated the twister generated winds of about 200 km/h (125 mph).

The winds grew and began to swirl violently, landing first on the roof of Nic Accardo's Brewster Cres. home. The tornado slammed down and tore the roof and front of the home away before bouncing for the first time, almost coming down on a swimming pool full of children.

A Sheppard Ave. W. resident who didn't want to be identified said, "I saw the storm warning and thought the children shouldn't be out in that kind of weather. I ran down to the swimming pool (at Stanley Park Community Centre) and they were just closing it down. I got (a group of) children and we ran! It was just black up there and the hail was coming down."

The woman huddled the children in a corner of St. Camillo de Lellis School with the tornado screaming overhead. "Anybody who said they weren't scared is either foolish or a liar. I felt everything being pulled up as it passed over us. I put as much weight on the children as I could. The wind was tremendous and one of the little ones could have been pulled away."

After passing over the school, the twister skimmed over four homes on Laura Rd. and slammed down on Angelo Pennacchio's 139 Honeywood Rd. home.

"My father was in the garage and my mother was outside when she saw this fog thing come right by," Pennacchio's son Pat, 22, said. The roof was sheared off and slammed into Frank Savoiardo's home across the street.

"When the tornado hit 139 (Honeywood) it broke up and landed on my house," Savoiardo's son, Joe, 19, said. He had been in the garage when the twister dropped and he ran to the backyard for cover. "My brothers and I were in the garage. Right away we knew it was a tornado. I got tossed around as I ran to the back of the house. My brother Nino dove under the picnic table when we saw the roof coming from across the street," he said.

The twister bounced again and had crossed Sheppard Ave W. and Hwy 400 before it came down on the Eaton's Warehouse Store, where it demolished a bus shelter before striking the northeast corner of the building.

Store manager Jim Matthews said until the damage is assessed he will have no idea of the cost or how long the store will remain closed. Three display windows were blown in, spraying clothing with shards of glass, and numerous north-side windows were broken.

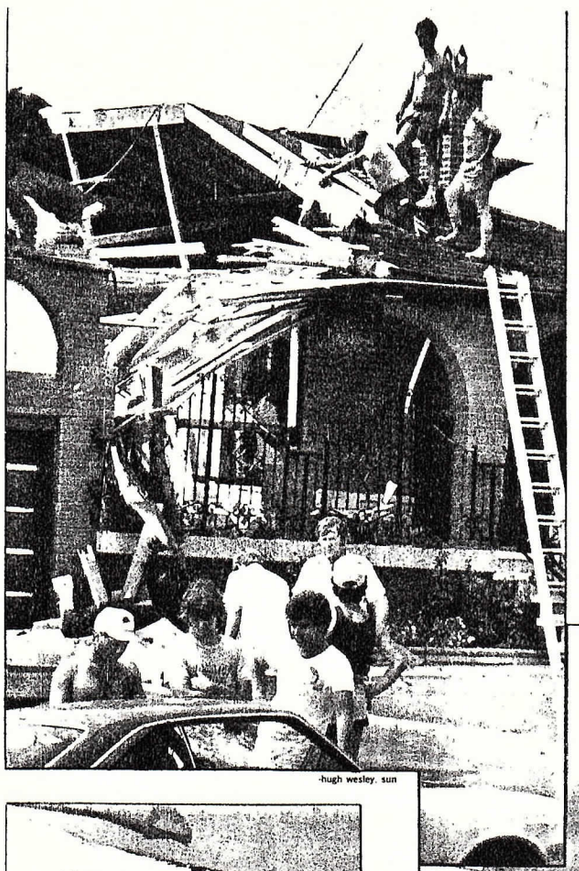
"They are still trying to figure out how much of the roof came up," Matthews said. "Seven or eight cars were damaged in the parking lot – one of them was mine. Two windows were blown in and my wind shield was cracked," Matthews said

Parts of the roof were found in the west-side parking lot this morning.

The tornado worked toward the southwest and struck the Woolco warehouse, rolling one trailer into another. A large portion of the southeast corner of the roof was ripped away.

Woolco security guard Chuck Reynolds, 21, of Sheppard Ave. E. was in the Eaton's bus shelter when the twister closed in. "We could see it spinning and coming toward us. It picked up the shelter and let it back down while we were in it," Reynolds said. "We ran out and it was bent over . . . the wind took it away as we got onto the bus."

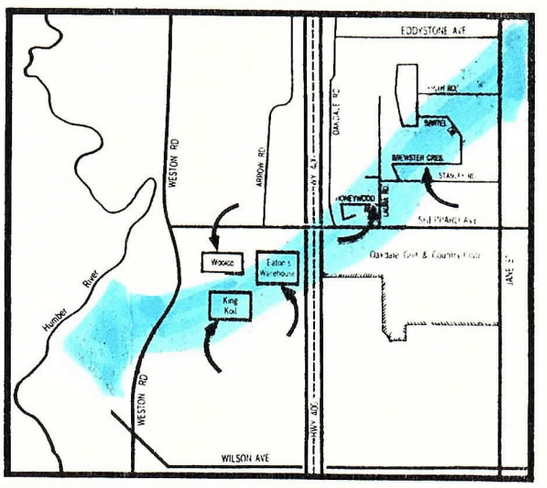
The tornado slammed into the north side of Bedford Bedding and Upholstery Ltd., manufacturers of King Koil mattresses, wiping out a large portion of the roof and ripping down the north wall, causing millions of dollars in damage to the plant

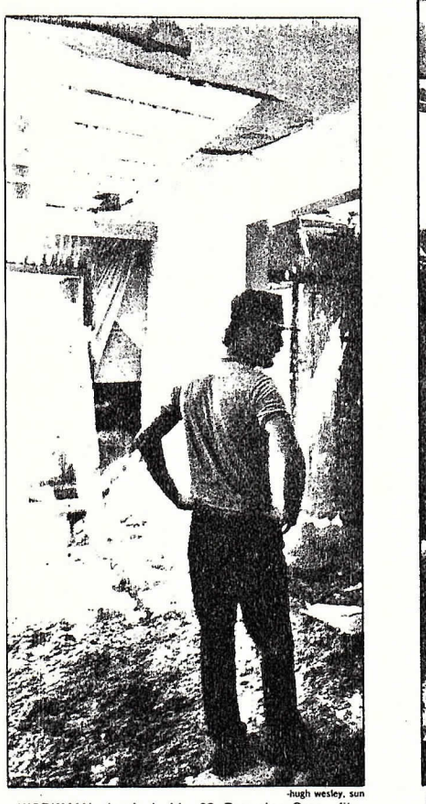


-hugh wesley, sun

LEFT: A car with a shattered windshield draws the attention of neighborhood youngsters as work crews began the clean up at 138 Honeywood Rd. yesterday. The house was one of two on the street whose roofs were destroyed by the tornado that struck the Jane/Sheppard area.

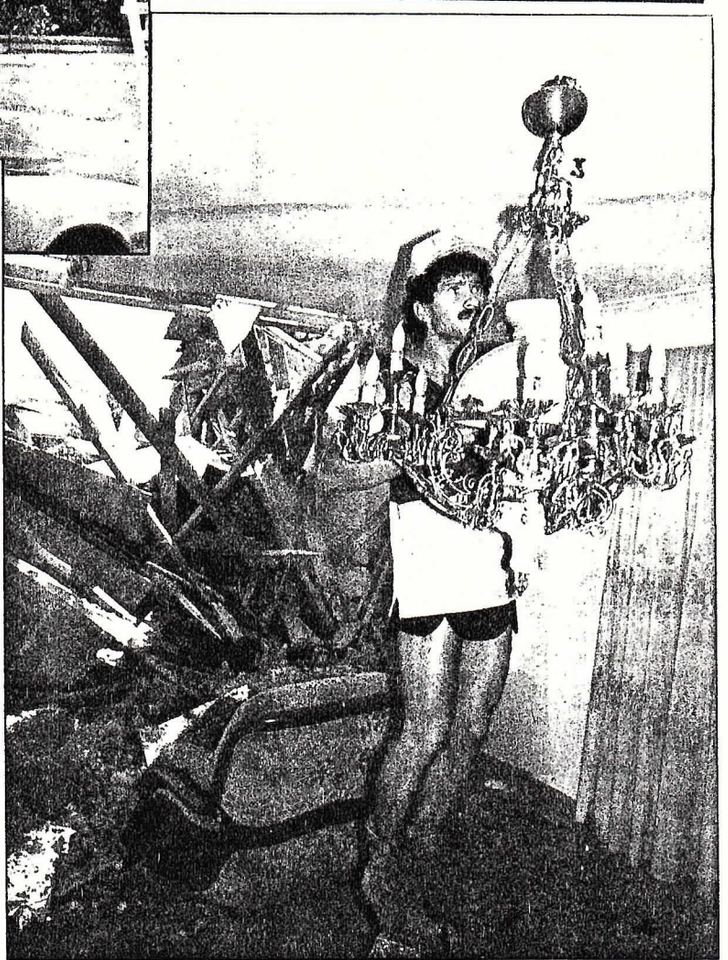
BELOW: Map shows the path of the twister, which caused millions of dollars in damage in North York Tuesday evening. The small arrows mark the sites where the tornado touched down.





-hugh wesley, sun

WORKMAN stands inside 68 Brewster Cres., littered with insulation from the damaged roof.



-hugh wesley sun

MARIO Savoiardo climbs a ladder to take down the chandelier in his father's house at 138 Honeywood Rd. The shambles in the background is what remains of the living room.