



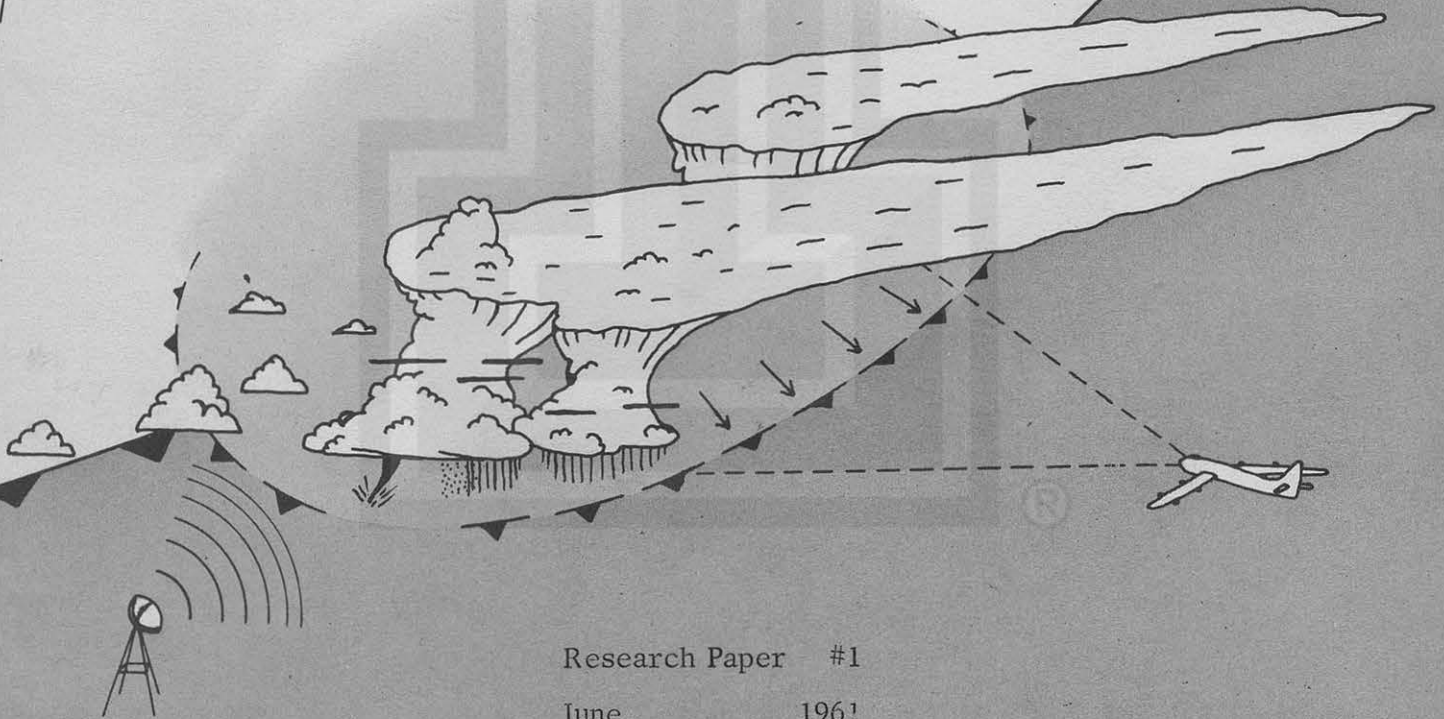
MESOMETEOROLOGY PROJECT

*Department of the Geophysical Sciences
The University of Chicago*

REPORT ON THE CHICAGO TORNADO
OF MARCH 4, 1961

by

Rodger A. Brown and Tetsuya Fujita



Research Paper #1

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Technical Report to the U. S. Weather Bureau
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Abstract

A survey of the damage caused by the Chicago tornado of March 4, 1961, based on aerial photographs and newspaper accounts, is presented. In addition to a map showing the location of actual damage, each of the following are plotted separately: wind and pressure effects, pressure effects alone, funnel sightings, sound, reported times of occurrence, and hail and lightning. What was thought to have been a second tornado 12.4 miles south of the Chicago track is shown to be simply a destructive gust of wind.

1. Introduction

On March 4, 1961, a tornado struck Chicago's south side. It started just outside the western limits of the city, 11.5 miles south-southwest of the Loop, at about 1706 CST. As it moved east-northeastward across the city, it skipped, causing extensive damage in some areas and barely touching others. When it passed off over Lake Michigan, it left behind six and one-half miles of intermittent destruction and about 115 injured, one of whom died six hours later.

This tornado, the earliest in the season, was the most destructive of the ten tornadoes recorded within the city limits in the past 90 years. All ten of the tornadoes are listed in Table 1. The paths of five of these are shown in Fig. 1. This figure is not intended to show either the width of the paths or the areas of skipping, if any.

Date	Location	Killed	Damage	Comments
May 6, 1876 5:10 pm	went from city into harbor		\$250,000 (\$800,000)	moved to NE; vessels damaged in harbor
May 25, 1896 1-2 am	along northern boundary of city		\$100,000* (\$400,000)	moved to E; started at DesPlaines River
Mar. 28, 1920	through NW corner of city	20*	\$2,000,000* (\$2,600,000)	moved to NE; moved with skips from Joliet to Wilmette
Mar. 28, 1920	through west-central part of city		\$150,000* (\$200,000)	moved to NE
Apr. 7, 1929	southern part of city	0	\$3,000 (\$6,000)	short and narrow path
May 1, 1933		4*	\$500,000* (\$1,300,000)	also in central and northern Illinois
Apr. 18, 1955	in extreme northern part of city		\$100,000* (\$110,000)	also damage in southern Evanston just N of city
May 26, 1955 4:00 pm	touched SW border of city	0	\$50,000* (\$55,000)	moved to NE from Blue Island area; 2 injured*
Aug. 30, 1958 10:55 pm	southernmost part of city		\$25,000 (\$26,000)	moved to ENE; 1 mi long
Mar. 4, 1961 5:05 pm	across southern part of city	1	\$7,000,000 (\$7,000,000)	moved to ENE; 6.5 mi long; skipped; 115 injured

*Over entire path of tornado
() Estimated 1961 price-index value

Table 1 — Chicago Tornadoes Since 1871



2. Weather Conditions of March 4.

During the morning and early afternoon of March 4, a low pressure area with a central pressure of 1000 mb was approaching Chicago from the west-southwest. At 1700 CST, it was over Chicago. Figure 2 shows a warm front entering the city's western edge. The movement of the cold front into the area of warm, unstable air gave rise to isolated thunderstorms as well as to the tornado.

The 500-mb chart for 1800 CST is given in Fig. 3. It can be seen that the strong west-southwesterly winds aloft over Chicago provided the steering mechanism for the movement of not only the low pressure area but also the tornado.

Pressure and temperature traces at various locations around the city and suburbs at the time of the tornado are shown in Fig. 4. Due to errors involved in expanding these data from the original charts, with their condensed time scales, the times presented in this figure may be several minutes off. The distance between each set of horizontal lines on the pressure chart represents .02 in, and on the temperature chart, 5^oF.

At all of the locations, the passage of the cold front is denoted by a sharp rise in pressure and, in most cases, a pronounced drop in temperature. The temperature trace at the Filtration Plant shows both the passage of the cold front and, earlier in the afternoon, the increasing temperature that accompanied the passage of the northward-moving warm front.

3. Aerial Survey of Damage Path

During the early afternoon of March 5, Dr. Tetsuya Fujita and Henry A. Brown flew by helicopter along the tornado path, taking a series of photographs of the damage. All significant damage information obtainable from the photographs and newspaper accounts is shown in Fig. 5. Also shown are photographs of the destruction at various points along the path.

As will be noted in Fig. 5, a considerable amount of the damage can be called "backyard" damage. It was found that in most areas, garages were demolished and trees uprooted, while houses on the same property had nothing more than broken windows, missing shingles, and the like (see photograph F).

Photograph K shows an unusual example of backyard damage to trees. From the aerial photographs there seems to have been no serious damage to the surrounding buildings. However, a close scrutiny of photograph K shows that the trees in the foreground fell toward the east-northeast while those in the background were blown toward the northwest. It is likely that the diverging directions would indicate that the center of the tornado passed between the tree in the foreground and those in the background, probably closer to the latter.

In photograph E, there is an interesting pattern of debris left by the tornado as it passed across West Chatham Park. The thickest part of the debris lies 50° to the north of the direction of advance with the remainder trailing off about 25° east of the direction of advance.

Figures 6 through 11 show the locations of the following reports: wind and pressure effects, pressure effects alone, funnel sightings, sound, time, and hail and lightning, respectively. In nearly all of the cases, the reports were obtained from newspaper accounts. Most of the remaining reports were obtained through the local office of the U. S. Weather Bureau.

The most noteworthy accounts of damage caused by wind and pressure effects are shown in Fig. 6; the thicker borders around some of the descriptions indicate that Fig. 5 contains photographs of the described damage.

Using the times shown in Fig. 10, an average forward speed of the tornado was calculated to be about 45 mph. This means that the tornado started about 1706 CST and reached Lake Michigan about 1715.

Even though there are no known photographs of the tornado itself, Figs. 5 through 11 leave no doubt that the storm was a tornado: 1) the sightings of a funnel, 2) the characteristic roar, 3) the types of damage, and 4) the long, straight, and narrow path.

4. Investigation of the Homewood Storm

According to press accounts, the tornado caused damage in Homewood, 12.4 miles due south of the tornado track, before it touched down near 91st and Western. It was immediately obvious that the Homewood damage could not have been caused by the same tornado. Since roofs were carried through the air and a garage lifted, Rodger A. Brown went to Homewood to ascertain whether the damage had been caused by a second tornado.

Figure 12a shows the extent of the damage in Homewood. The type of damage indicated little likelihood that a tornado had occurred. In addition, no one saw a funnel or heard any sounds other than the downpour that was occurring at the same time.

It appears that the damage was caused by a gust of straight-line wind. A tree was blown down toward the east-northeast and a dormer under construction on the south side of a house was blown away. The rest of the damage, estimated at \$8,000, was due to poor construction. In the 1700 block of Evergreen Road, the two houses constructed like the one (with roof replaced) shown in Fig. 12b had their roofs lifted intact. One roof flew into two houses on 183rd Street. The other hit a utility pole and dropped into the backyard of a nearby house on 183rd Street. Also, a garage on Evergreen Road was lifted, rotated 40° counterclockwise (apparently because of the placement of nearby buildings) and dropped just at the northeast corner of the concrete garage floor. It should be pointed out that the garage was held down by fewer than a dozen nails.

The Homewood gust, occurring simultaneously with the Chicago tornado, also was associated with the cold front passing through northeastern Illinois.

Acknowledgements

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Henry A. Brown, for use of his aerial photographs of the tornado damage;

TV weathermen Warren Culbertson of WBKB, P. J. Hoff of WBBM-TV, Ned Locke of WGN-TV, and Harry Volkman of WNBQ, for their cooperation in asking the public for information about the tornado;

Phyllis Woolridge, Kendall Laughlin, Chicago American, Chicago Sun-Times, and Chicago Tribune, for furnishing photographs of tornado damage;

Argonne National Laboratory, Dr. Horace R. Byers, South District Filtration Plant (Dept. of Water and Sewers), and the U. S. Weather Bureau for providing copies of their microbarograph and/or thermograph charts;

Commonwealth Edison Company for supplying the times of the power failures caused by the tornado;

and the many others who assisted this study by furnishing damage and weather information.



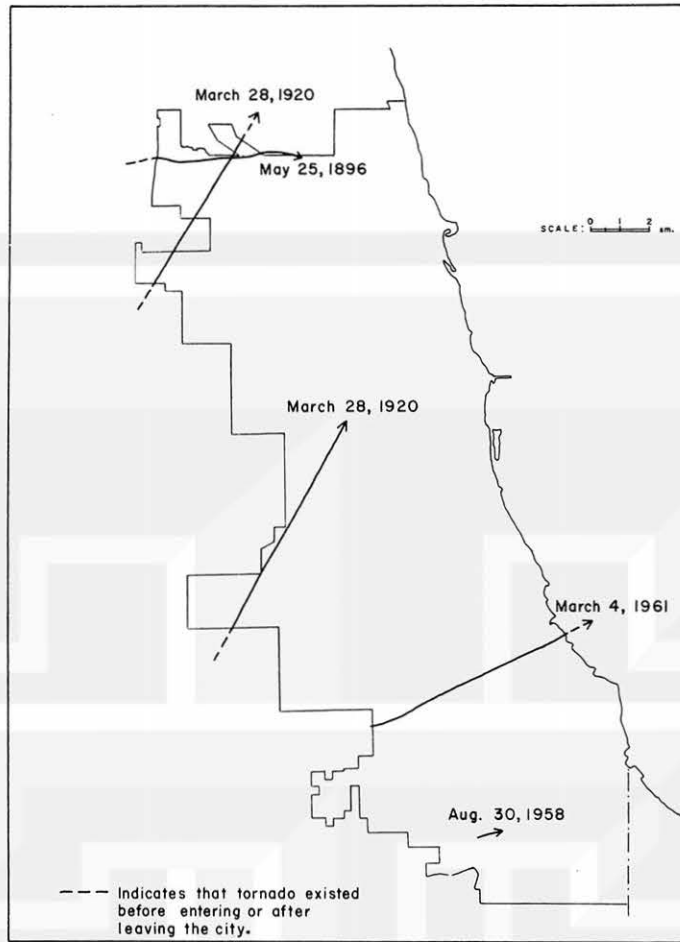


Fig. 1 Paths of five tornadoes in Chicago. The path width and regions of skipping, if any, are not indicated.

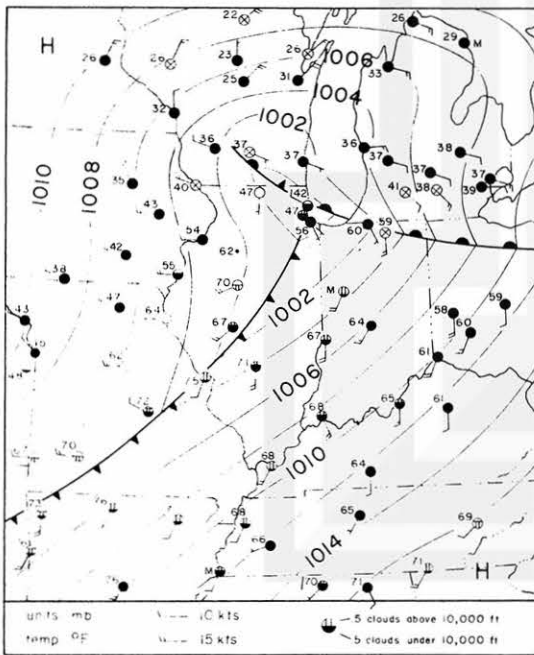


Fig. 2 Sea level pressure chart showing the synoptic situation at 1700 CST on March 4, 1961.

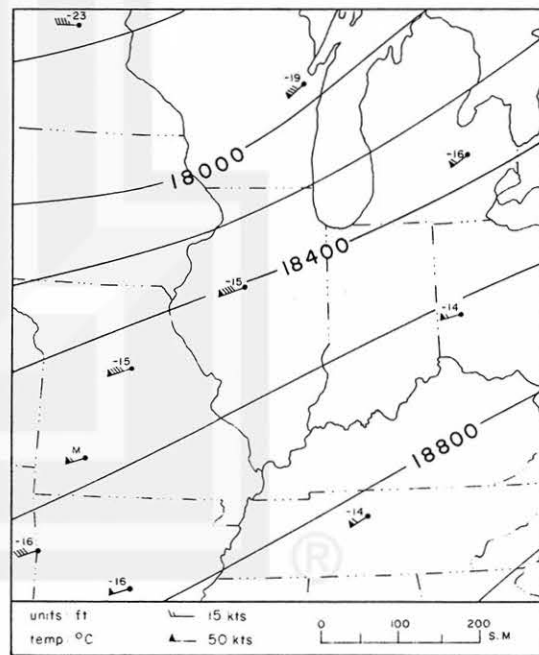


Fig. 3 The 500 millibar chart for 1800 CST, March 4, 1961.

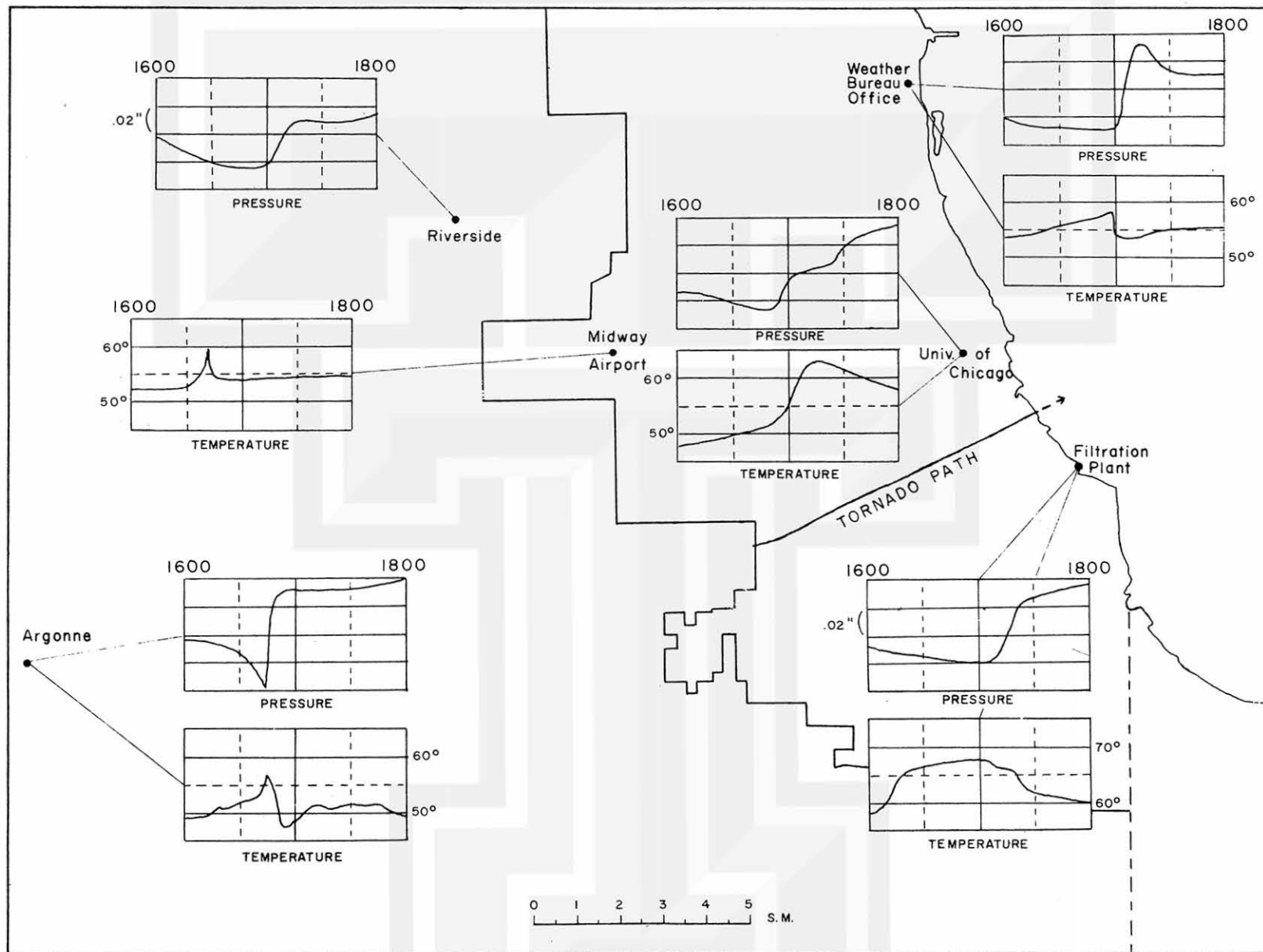


Fig. 4 Pressure (inches) and temperature ($^{\circ}$ F) traces at various locations near the tornado track. All pressure traces have horizontal lines .05 in apart; the actual sea level values not being available.

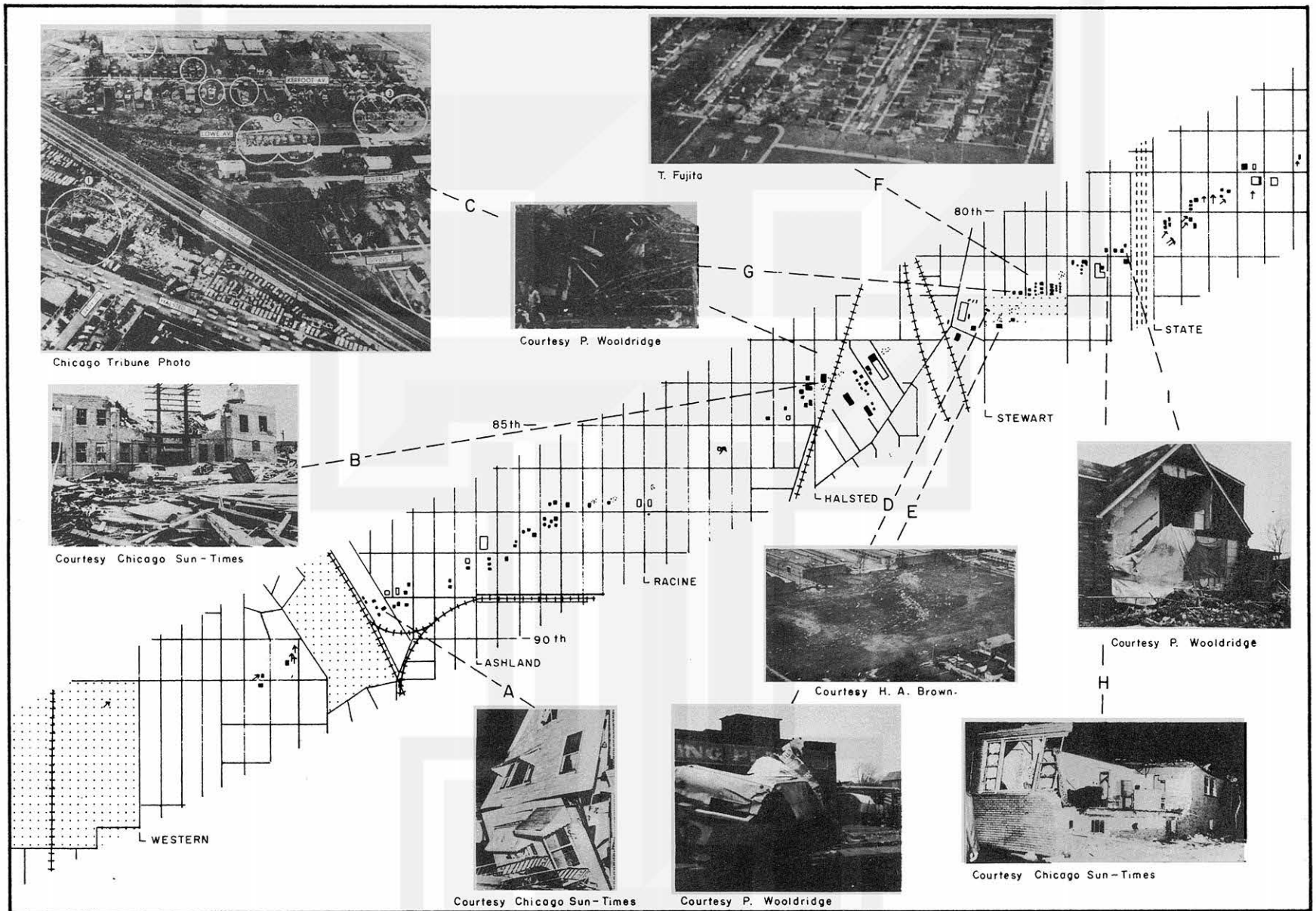


Fig. 5a Major damage along the western half of the tornado path, with photographs of some of the damage. Outlined buildings represent lesser damage. Arrows represent trees, showing the direction in which they fell. Debris is indicated by groups of dots.

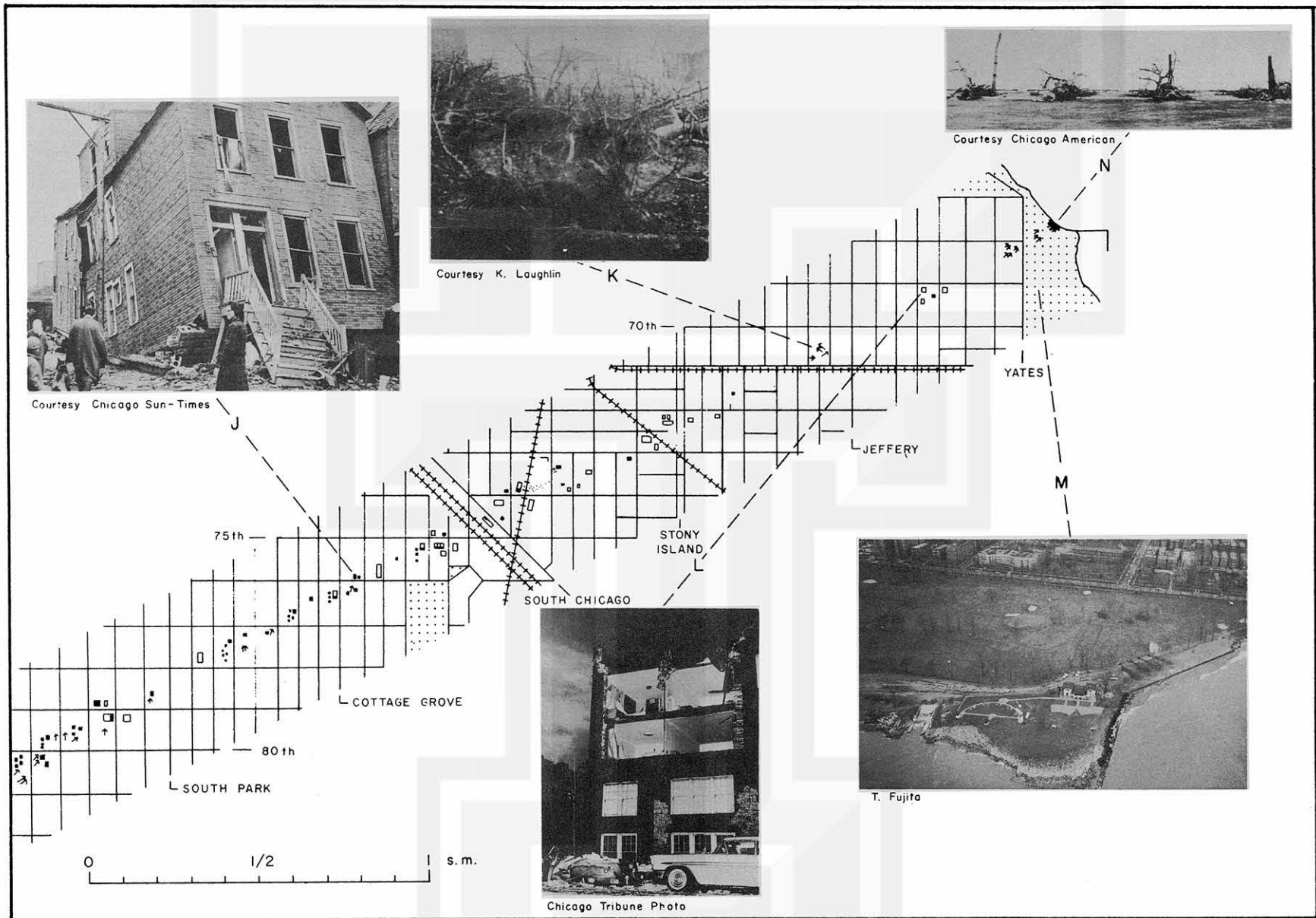


Fig. 5b Major damage along the eastern half of the tornado path, with photographs of some of the damage. Outlined buildings represent lesser damage. Arrows represent trees, showing the direction in which they fell. Debris is indicated by groups of dots.

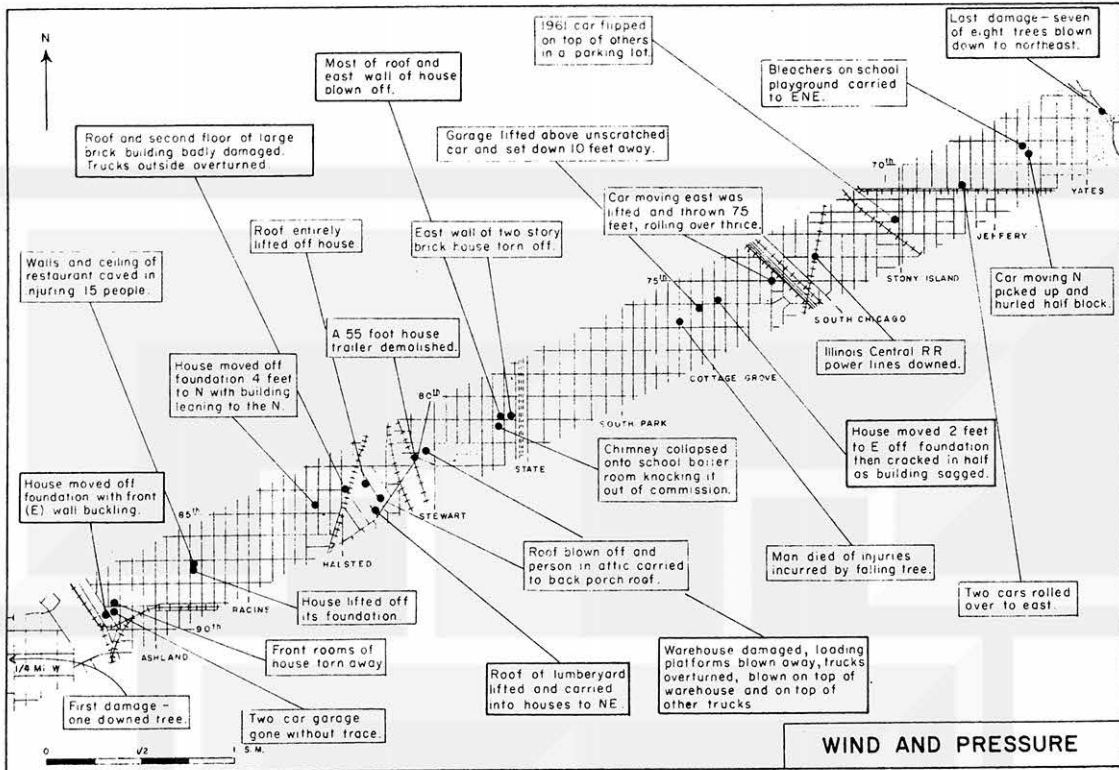


Fig. 6 Accounts of wind and pressure effects caused by the Chicago tornado. The wider borders indicate that pictures of the descriptions can be found in Figure 5.

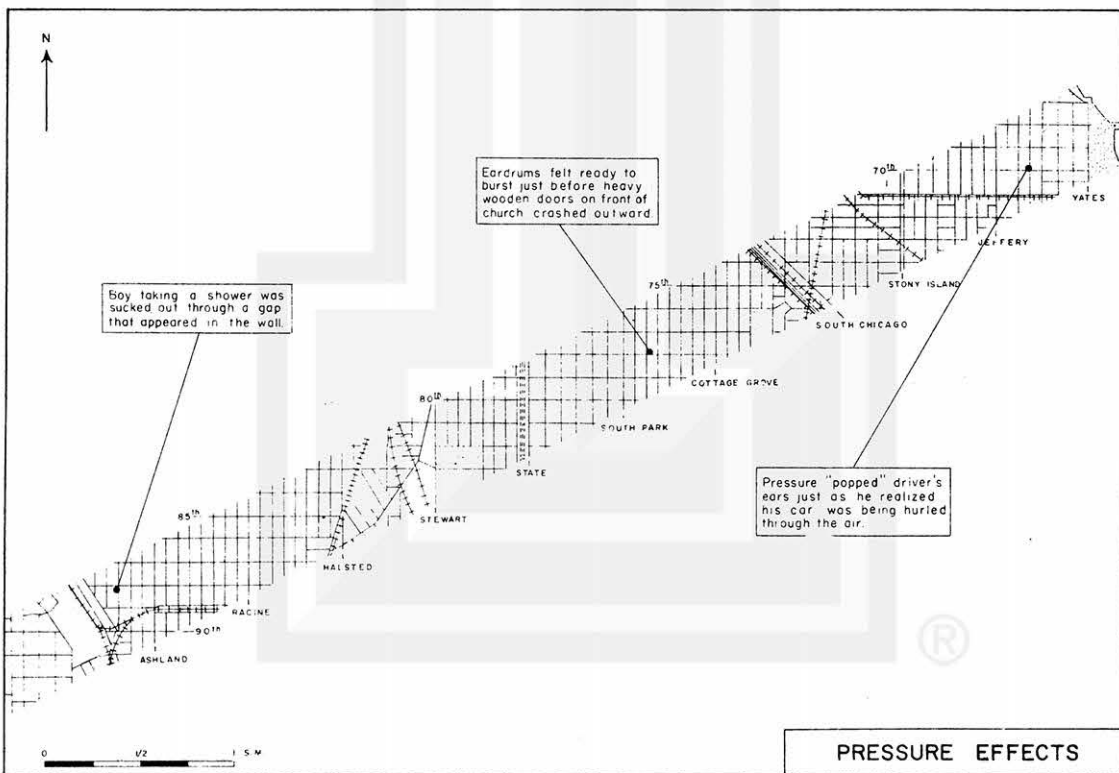


Fig. 7 The effects of pressure alone associated with the Chicago tornado.

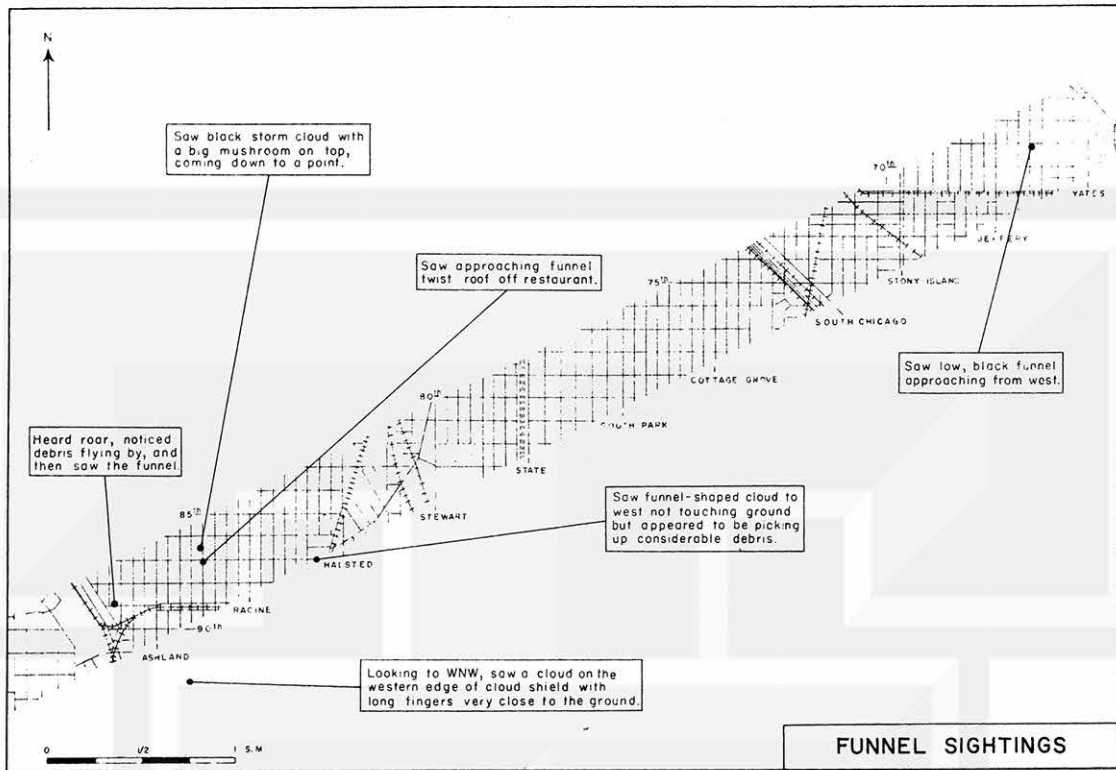


Fig. 8 Reports of sightings of the tornado funnel.

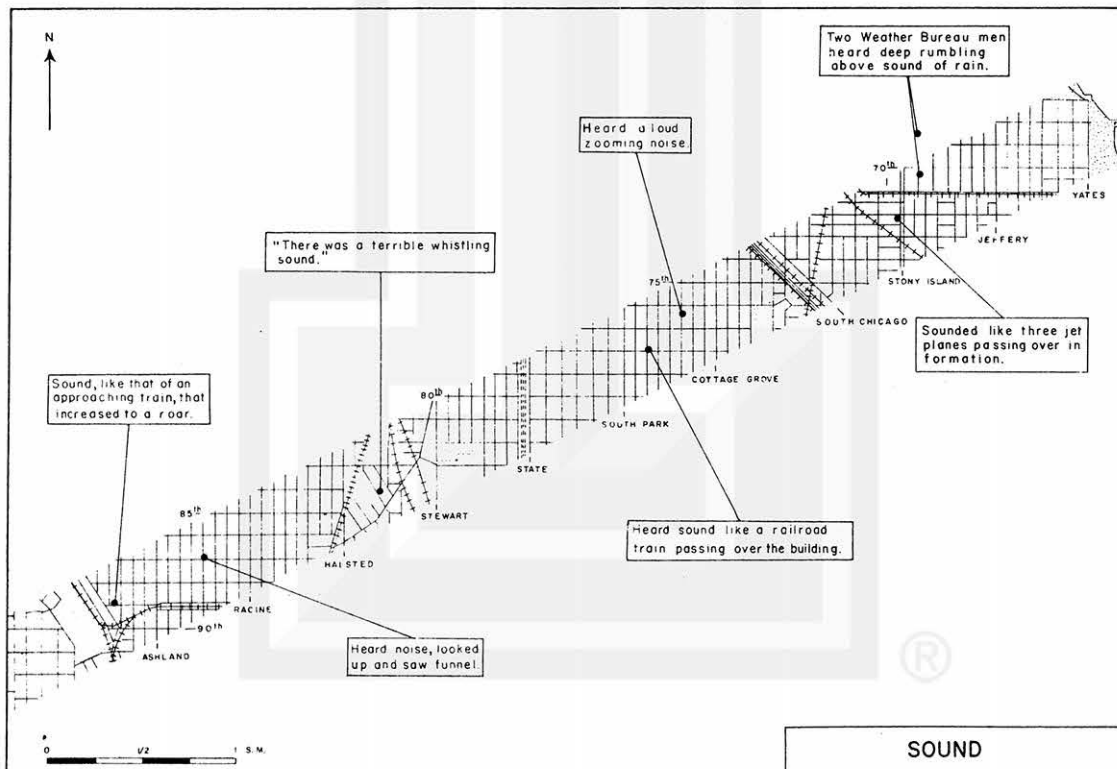


Fig. 9 Locations where the sound of the Chicago tornado was heard.

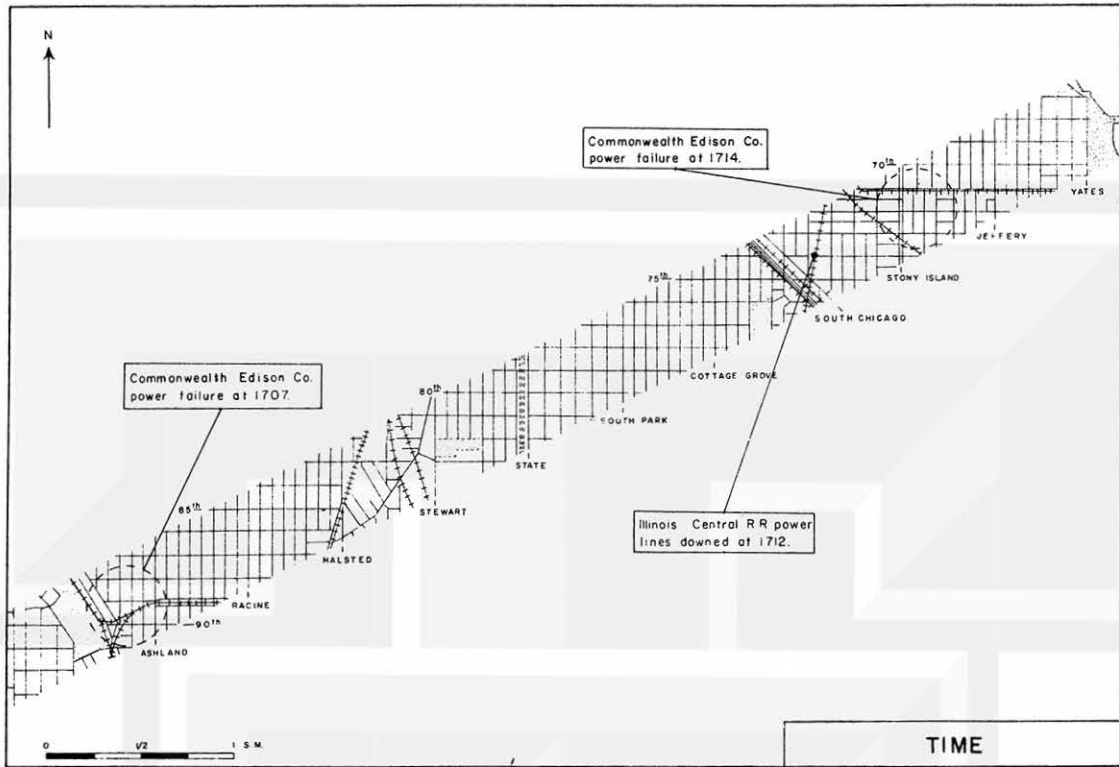


Fig. 10 The times of tornado passage.

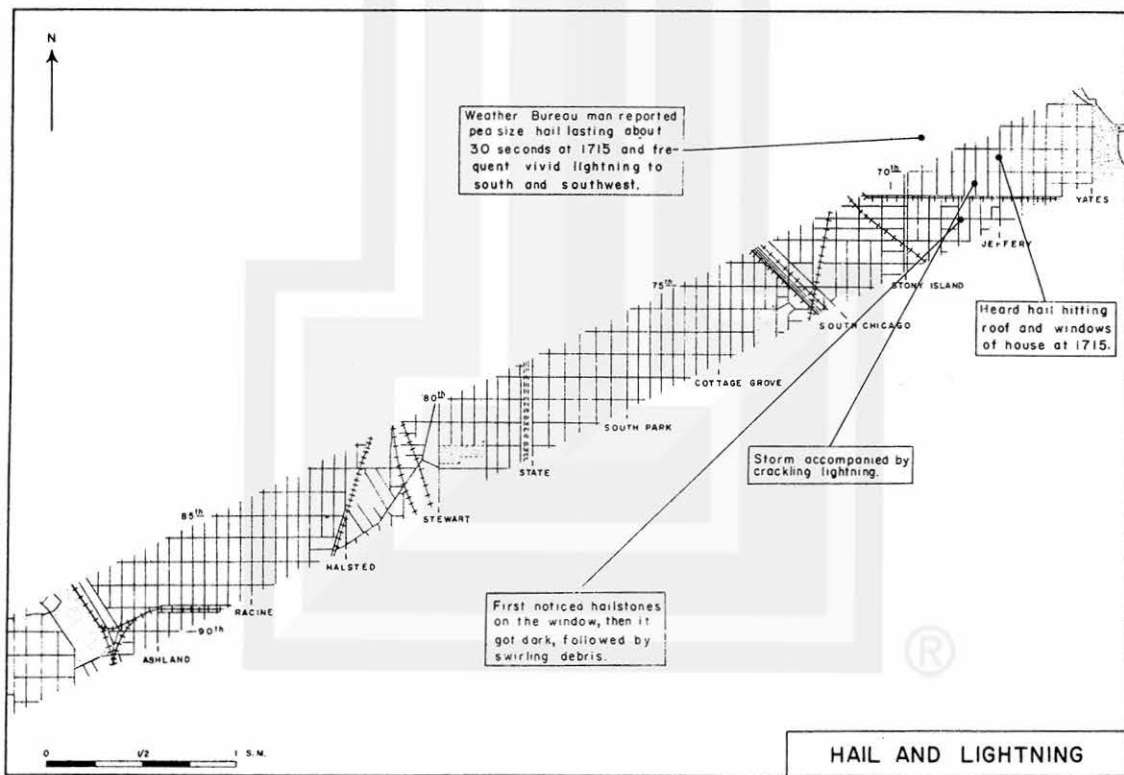


Fig. 11 Locations of hail and lightning observations.

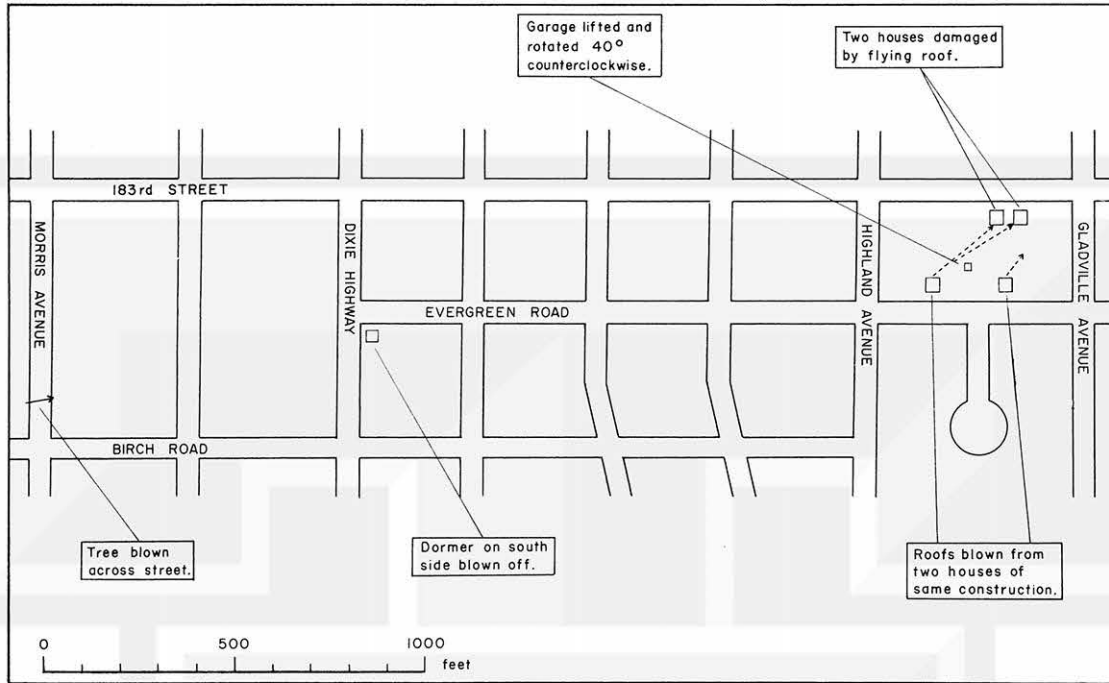


Fig. 12a Damage caused by the Homewood storm of March 4, 1961.



Fig. 12 One of the two houses on Evergreen Road that had its roof blown off. (Picture taken during placement of new roof.)