2.2 LESSONS WE MUST LEARN - DEADLY TORNADOES IN CENTRAL TEXAS

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1. INTRODUCTION

On 4 May 1922, two simultaneous tornadoes developed and moved across parts of Austin shortly before 1600 UTC. The tracks of the tornadoes were separated laterally by less than four **miles.** One tornado developed just southeast of the State Capitol near 9th Street and Comal Street, and the other developed five to six miles to the northwest of the State Capitol, in what was then a rural area. Retrospective analysis of the tornado damage in Grazulis [1991] rated that of the eastern tornado as F4, and the western tornado as F2. Twelve people died in the eastern tornado; there were no deaths reported with the western tornado. The total number of injured from both tornadoes combined was between fifty and sixty.

Much of what we know about the events of that day is based upon published reports written by two individuals who were employed at the University of Texas. Fred Morris worked in the mechanical engineering department, and was a cooperative weather observer. He wrote a detailed summary of the event which was published in the **Monthly Weather Review**, then a publication of the U.S. Weather Bureau. The other individual was Frederic W. Simonds, Ph.D., the chairman of the Dept. of Geology at the University of Texas. His report was published in the **University of Texas Bulletin** and was presented at the annual meeting of the Southwestern Geological Society in Dallas, Texas that same year (1922). It does not appear that the two men worked together or shared the information found in their respective reports, but that possibility cannot be excluded.

2. THE "EASTERN" TORNADO

Morris provides a detailed description of the evolution of the eastern storm before the tornado evolved, including what was apparently the development of a wall cloud: "As the second cloud moved southward there was a visible lowering of the central portion of its base, (with) violent churning about this protuberance, and the whole base of the cloud seemed badly agitated." He describes an acceleration of events as the whole storm moved southward ("30 degrees west of due south") with the first damage (branches torn from trees caused by a fierce whirlwind) located at the State Cemetery at East Ninth Street and Comal Street.

From there, it moved south-southwest ("30 degrees west of due south"), crossing Sixth Street at its intersection with Navasota, where two buildings were badly damaged, and continued moving toward the south-southwest to First Street at Waller, where one of Austin's tall light towers was knocked down over a fire station. Many buildings were damaged or destroyed as the tornado continue southward and crossed the Colorado River into Travis Heights. In crossing the river, the tornado lifted "an enormous volume of spray".

The tornado continued toward the south-southwest, damaging or destroying homes, and people in the taller buildings in downtown Austin could "clearly see the materials of buildings being thrown high into the air as building after building was struck". The tornado severely damaged a dormitory, gymnasium and the power plant at St. Edwards College, where one death occurred. Turning slightly more to the right (southwest), the tornado destroyed the Woodward Manufacturing Plant at Penn Field, where the most severe structural damage along the tornado path occurred.

Immediately after striking Penn Field, the tornado turned more to the right, traveling toward the southwest, and passed through the St. Elmo

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neighborhood, where the Hartkoff Dairy and two homes were struck directly and destroyed, while other nearby buildings were damaged. The width of the tornado path reached its maximum in this area (at least 225 yards wide). Morris noted: “Trees blown down along the western edge of the path were lying to the south, while those on the east side were lying to the north.” The tornado continued toward the southwest and destroyed a number of farm properties in its path, including a neighborhood at Davis Hill, about halfway between Manchaca and Oak Hill. Morris’ narrative continued: “The funnel then turned abruptly toward the west and completely swept away the Bargsley home, killing six persons. From this point on slight damage was done to farm property … and finally lifted from the ground.” Although Morris also described the track and damage caused by the “western” tornado, Simond’s article provides greater detail.

3. THE “WESTERN” TORNADO

In Simonds’ article, he describes being alerted at his home by “excited shouts” from people in the neighborhood, directing his attention to an unusual cloud display to the northwest of his home, which was 1 ½ blocks north of the university campus. He describes seeing a “quickly advancing, dark and threatening mass of storm cloud from which depended a rapidly whirling funnel so characteristic of tornadoes”. Simonds noted, however, that the funnel was “not hanging directly downward, but was inclined to the west or south of west at an angle of 45 degrees.” Simonds believed that “this deflection may have been due to topographic effects” because of the proximity of the tornado’s base to the topographically rough edge of the Balcones Escarpment. He further noted that the 45-degree angle kept the tornado at the ground somewhat west of the structures, decreasing the damage potential.

Simonds did note that the tornado contacted the ground in at least four locations, including “extensive damage” at a state facility for physically and visually impaired youth, “near the northwest limits of the city”, and at Deep Eddy, then a summer camp on the Colorado River. At the former location, the laundry, a brick structure, was virtually destroyed, with three of its four walls being blown outward, and other buildings being blown from their foundations. At Deep Eddy, trees were uprooted or stripped clean of foliage, cabins were unroofed or blown down and observers tree trunks and branches were carried high in the air.

4. TRACK MAP AND PHOTOGRAPHS

Simonds’ article contains a figure showing the track of both tornadoes on a single map of Austin and vicinity. On it, the two tracks appear to be approximately parallel despite different origins relative to the State Capitol, which appears in photographs of the “western” tornado. The map appears on page 5 hereafter. Several photographers in the city of Austin were able to capture images of both tornadoes, although the “eastern” tornado was less photographed during much of its passage through the city, perhaps because it was (at times) rain-wrapped, or partially obscured by spray from the Colorado River, and from debris it was ingesting. Simonds’ article does contain two photographs of the “eastern” tornado looking southwest from the University of Texas as that tornado neared the end of its destructive path. On the other hand, there are numerous photographs of the “western” storm, likely because it was on the western flank of the storm system and displaced away from the “eastern” storm. These photographs appear on pages 4 and 5.

5. THE WEATHER PATTERN ON MAY 4, 1922

There is virtually no surface or upper air data available for the 1922 Austin event. There were no regular surface observations from any location in or near Austin, only once daily recording of climatological data at 7 am local time. There is no record of any upper air observations for the date of occurrence. A review of the available climatological data only very generally suggested that there may have been drier air at the surface well west of Austin and a surge of warm, moist air moving northward from the Gulf of Mexico that possibly reached Austin sometime on the day of the tornadoes. Because of the dearth of data upon which one could base a scientific opinion as to the factors that produced the tornadoes in Austin, we are left to, at best, informed speculation.

An interesting aspect of this event is the unusual direction in which the two tornadoes traveled, which was described by both Morris and Simonds as being toward the south-southwest. This unusual storm motion was duplicated in 1997 when a series of tornadoes in Central Texas moved from McLennan County (near Hewitt) through Bell County (Lake Belton, Lake Stillhouse Hollow, and Prairie Dell) to Williamson County (Jarrell and Cedar Park) and then to Travis County (Lakeway and Bee Caves). Twenty-seven people died at Jarrell when an extremely violent tornado struck a residential area between 3:30 and 4:00 pm on May 27, 1997.

Other strong and violent tornadoes in Central Texas have also moved toward the south-southwest, including tornadic thunderstorms that formed over San Saba, Mason and Gillespie counties in 1999, and another that formed over Lake Whitney (northwest of Waco) and moved toward the south-southwest to near Fort Hood and Killeen. These more recent events had in common very high surface-based convective available potential energy (CAPE) and relatively weak flow in the mid-levels of the troposphere, leading to the parent storms being "hard-right movers", with storm motion influenced primarily by updraft propagation toward the greatest instability, rather than by advection by the 0-6km mean wind. Although the temptation is strong to attribute the south-southwest motion of the May 4, 1922 Austin tornadoes to similar conditions in the lower and middle troposphere, in the absence of reliable surface and upper air data, we will never know with certainty

6. DEADLY TORNADOES IN CENTRAL TEXAS

Between January 1, 1880 and December 31, 2017, 1,856 people died in tornadoes in Texas. The two deadliest tornadoes in Texas history both occurred within 180 km of Austin. In 1902, 114 people died and over 250 were injured at Goliad, 180 km south-southeast of Austin, and in 1953, 114 people died and 597 were injured at Waco, 156 km north-northeast of Austin. Retrospective surveys found that F5 damage occurred in the Waco storm and F4 damage in the Goliad storm. Table 1 on page 4 summarizes all tornadoes since 1880 that have occurred within 278 km (150 nautical miles) of Austin in which more than twenty people died in each event.

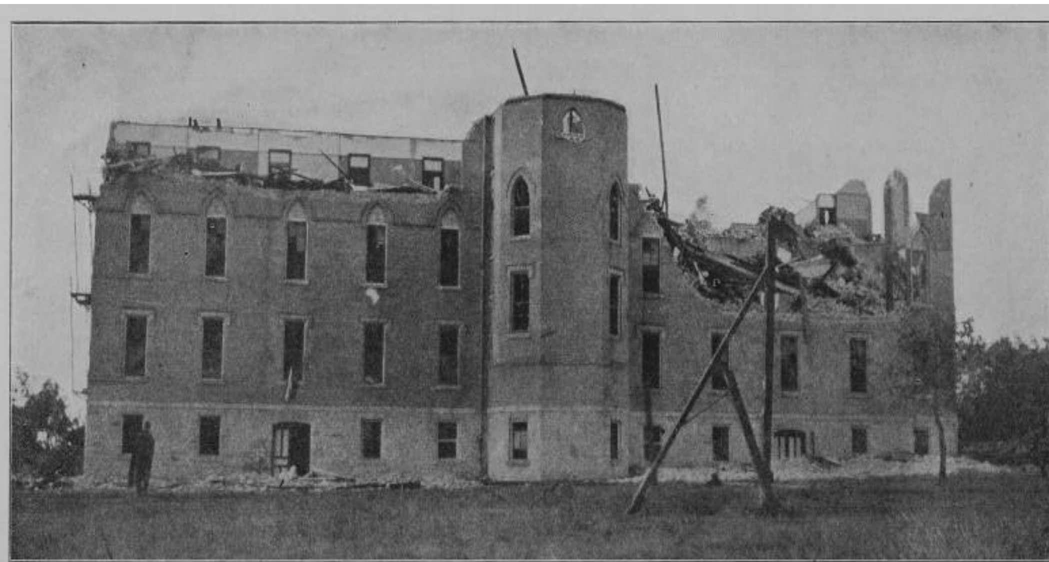
While the frequency of deadly tornadoes in Central Texas has decreased in recent decades, there is no scientific evidence suggesting that significant tornado events will not occur again. In fact, as the population of Central Texas continues increasing rapidly, and as population density does likewise, the potential for increased casualties from significant tornadoes surely looms as an important public safety issue. Any strong or violent tornadoes in the future may well expose many hundreds (perhaps even thousands) to the threat of serious injury or death. In 1922, the population of Austin was estimated to have been about 35,000. The population has steadily increased over the decades. In an interview published in 1970 in the Austin American-Statesman, David Barnes, the meteorologist-in-charge at the local National Weather Service office, speculated as follows: "If you think what could have happened if that tornado had hit this year, the death rate might have easily been 10 times as great."

Today, a significant tornado moving along either of the 1922 tornado paths in metropolitan Austin would pose the threat of a death toll easily three times that estimate (perhaps more), and one does not need a tornado that specifically follows either of the 1922 tracks to reasonably anticipate a massive number of casualties. It is equally important to understand that this threat is not limited just to the city of Austin. The area of rapid growth in population and population density stretches from Bexar County (San Antonio and its suburbs) on the south through Comal and Hays counties to Travis County (Austin) and Williamson County (Round Rock and Georgetown) to Bell County Fort Hood, Killeen-Harker Heights, Belton and Temple) to McLennan County (Waco and vicinity). It also encompasses other communities (not specifically named herein) where explosive growth has been and continues occurring.

Date Occurred	County(s) Involved	Dist./Dir. from Austin	F/EF Rating	Width (yds.)	Length (nmi.)	Reported Fatalities	Reported Injuries
5-18-1902	Goliad	97 nmi SSE	4	25	15	114	250
5-11-1953	McLennan	84 nmi NNE	5	600	23	114	597
4-12-1927	Edwards	130 nmi W	5	1,600	35	74	205
5-6-1930	Hill-Navarro-Ellis	116 nmi NNE	4	500	35	41	200
5-6-1930	Karnes, DeWitt	83 nmi S	4	300	20	36	60
5-30-1909	Brown	100 nmi NW	4	300	3+	34	70
1-14-1946	Limestone & eastward	104 nmi NE	4	800	20+	30	300
5-27-1997	Williamson	34 nmi N	5	650	5	27	12
4-28-1893	Eastland	140 nmi NW	4	1,000	13	23	150
2-8-1935	Leon, Houston	106 nmi ENE	2	300	10	12	70
5-4-1922	Travis	0	4	200+	15	12	50
5-31-1892	Bell, Falls	60 nmi NNE	4	250	10	10	20
4-2-1957	Dallas	150 nmi N	3	125	15	10	216

Table 1. Tornadoes within 150 nmi of Austin since 1880 causing 10 or more deaths.

Fig. 1. Photograph from downtown Austin of "western storm". (From Simonds' report.)



—*Jordan Company, Photographers*

Plate XI. The Second Austin Tornado of May 4, 1922. The wreck of the dormitory at St. Edward's College.

Fig. 2. Damage to dormitory at St. Edwards College. (From Simonds' report.)

Fig. 3 Photograph of "eastern storm" far to the southwest of downtown. (From Simonds' report.)

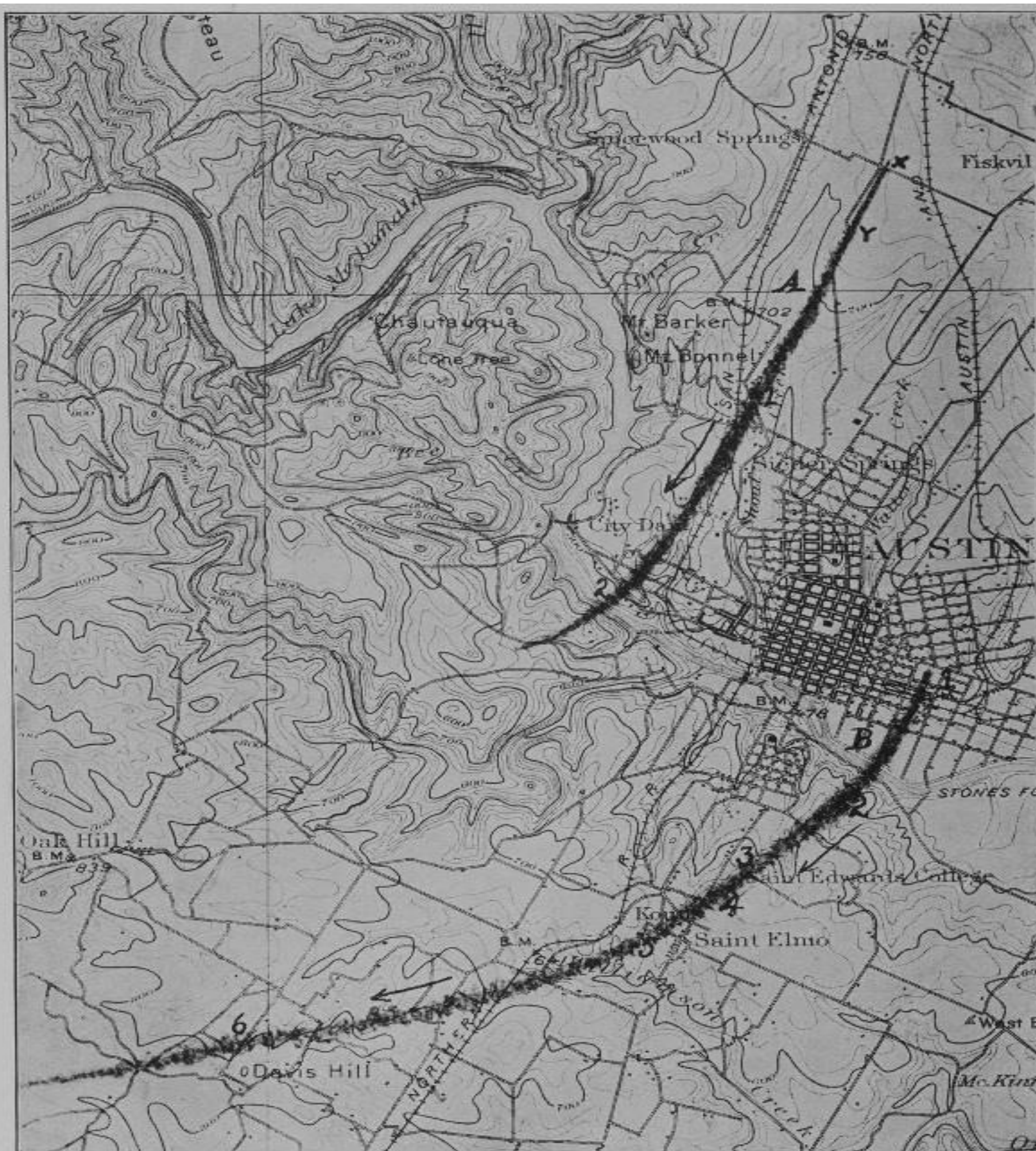


Plate III. Map showing the paths of the Austin, Texas, Tornadoes of May 4, 1922. "A" Tornado first seen in the northwest. "B" Tornado originating in the eastern part of the city. Base: Topographic map of the Austin Folio, U. S. G. S. Scale: |———|———|=2 miles.

Fig. 4. Plate III from Simonds' report showing a portion of a Travis County map and the two tornado tracks.

Table 1 (a) is a list of all reported tornadoes since 1880 occurring within 150 nautical miles of Austin, Texas, in which ten or more deaths occurred. This compilation was created using two primary sources: a) Significant Tornadoes 1680-1991 by Grazulis, and the online Storm Events database maintained by the National Centers for Environmental Information, which covers the periods 1950 through 2017.The table displays the general direction and distance of the event from Austin, along with the reported damage rating (i.e. the Fujita scale for events prior to 2007, and the Enhanced Fujita scale for events occurring in 2007 and subsequent years). The number of persons reported injured is shown, as are the path width (in yards) and the path length (in nautical miles).

As noted by Ashley (2007), "although there have been numerous advances in tornado detection, warning dissemination, and public awareness, tornado casualties cannot be prevented" and "although tornado fatalities during the past 50 yr have declined, it is suggested that fatalities within vulnerable housing stock continue to provide a major obstacle in reducing overall tornado death rates in the United States (Brooks and Doswell 2002). That same year, Wurman et al (2007) published an article in BAMS analyzing the potential for catastrophic tornado impacts in urban areas. Using the Chicago area as a potential target, they calculated that thousands of deaths could occur in some of their modeled scenarios. Although the magnitude of the potential number of dead and injured was subsequently questioned by Brooks et al (2008), who argued that the potential number of deaths was at least a magnitude too high, the Wurman et al article was the first of several articles positing that hundreds to thousands of deaths could occur if a violent tornado struck a densely-populated neighborhood.

After decades of relatively low rates of deaths caused by tornadoes, the annual rate in 2011 soared to 553. This spike was driven by multiple events. A seemingly incredible outbreak of tornadoes occurred on April 27, 2011, extending from Mississippi across Alabama into Georgia and Tennessee. In Alabama alone, 62 tornadoes occurred, and 247 deaths were directly attributed to the tornadoes there. Seventy deaths occurred in the other states mentioned above. But nature wasn't done. On May 22, 2011, a massive tornado struck the Joplin, Missouri vicinity, killing 158 people outright, and injuring 1,150 others.

The total tornado death toll for 2011 reached 553. Based on statistics from the National Severe Storms Laboratory, 2011 ranks as the **second deadliest year** in terms of tornado deaths, outranked only by 1925, when 794 deaths were recorded. Those deaths in 1925 were primarily the result of what is referred to as the "Tri-State Tornado", which was almost certainly a storm system that produced serial tornadogenesis (multiple tornadoes) across the states of Missouri, Illinois and Indiana.

The events of 2011 appear to have had a strong influence on the articles published after that year as emphasis shifted to the growing potential for catastrophic events because of increasing population density. A few articles are listed in the references because a detailed discussion of those is somewhat beyond the scope of the presentation to the 16th History Symposium to which this abstract relates. The reader who desires to follow-up on this subject matter is directed to these sources: Simmons and Sutter (2012), Ashley et al (2014), and Ashley and Strader (2016).

The May 4, 1922 simultaneous tornadoes at Austin must not be considered as odd or unusual events. Either of those tornado tracks, when viewed over a current map of the city, should raise alarm and concern, because a tornado following either track today would have the potential to impact a very densely populated area. As the city continues to grow in terms of population and in terms of density thereof, the potential for catastrophic casualties can only increase. And that is one of the reasons that we should not allow the passage of time to dull our awareness of events such as occurred in this case.

The famous words of George Santayana truly are echoing here: "Those who cannot learn from history are doomed to repeat it." The lesson in this case is that strong and violent tornadoes have occurred in the past in Central Texas, and it is virtually certain that they will again do so. The consequences of ignoring such a threat are potentially grave indeed.

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