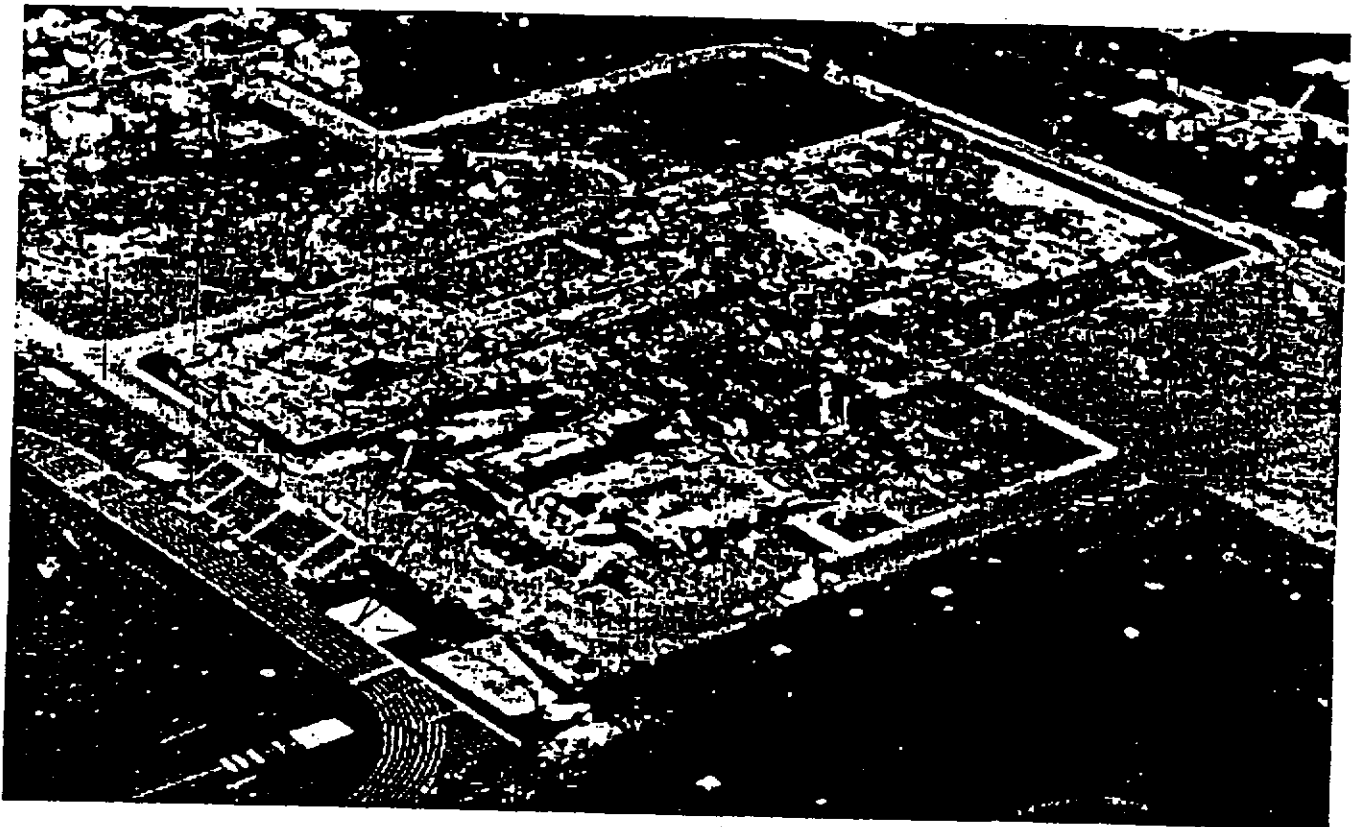


BUILDING TORNADO DAMAGE INVESTIGATION

Plainfield, Illinois (1990)



Photograph provided by Kay Jania

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EX 2851

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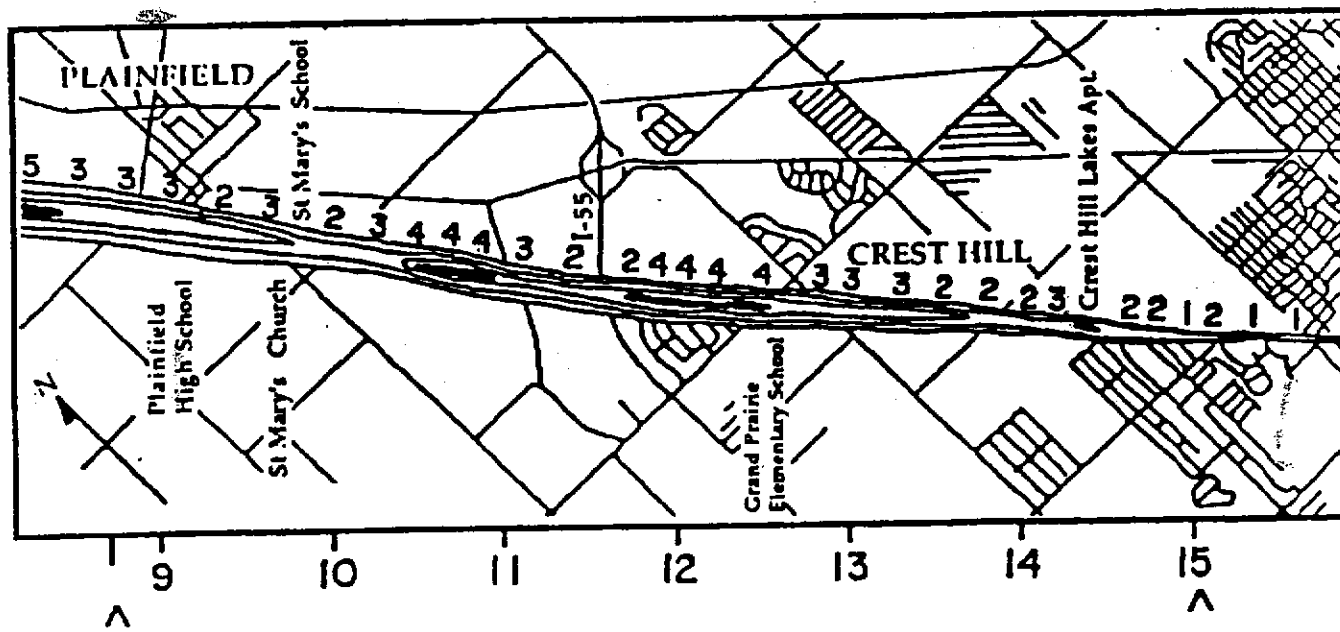
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At 3:35 P.M., Tuesday August 28, 1990 a violent (F5) tornado hit the Village of Plainfield, Illinois. Plainfield is a growing community (est. 1834) located approximately 30 miles WSW of Chicago. At daybreak the following morning, I began a series of personal investigations of the damage to some of the major buildings in the Village. My on-site investigation concentrated on the following buildings:

Electric Park Chautauqua Auditorium	demolished by storm
Plainfield Senior High School	demolished a few months after storm
Plainfield Administrative Services Building	demolished by storm
St. Mary Immaculate Catholic Church	demolished many months after storm
St. Mary Immaculate K-8 School	demolished days after storm

The Southeast storm path represented an extremely rare occurrence. The heavy precipitation and low cloud bases associated with the fast-moving storm caused identification of the tornado to be most difficult. The temperature-humidity combination was extremely high. The dew point was in the mid-70's. Most people had only a few seconds to reach "shelter" once the danger was recognized. 29 people were killed, including 5 inside the examined buildings. The storm "F-ratings" varied along this 1 mile path, from F-2 to F-5. This variance is questionable when one examines the construction of these facilities.

DAMAGE MAP



3:30 pm CDT

3:40 pm CDT

Map provided by Professor Fujita

Electric Park Chautauqua Auditorium (F5, no deaths)

This large auditorium, built sometime between 1904-1908 was a heavy timber dome. As the featured assembly space (capacity 4000 - 5000), it was initially the site of summer musical performances in the 20 acre Electric Park. At the time of the storm, it was used as a storage facility.

Plainfield Senior High School

(F3, 2 deaths)

This two-story high school (1200 students) was built in stages. Classes were scheduled to begin the following day. However the teaching and support staff were present when the storm hit. Boys football teams were practicing on the field just west of the school. The girls volleyball teams were practicing awaiting the arrival of another high school team that was late for a 3:30 game.

The most recent addition included an 800 person auditorium, cafeteria, classrooms and performing arts suite. Steel framing with a cementitious fiber roof deck predominated throughout the building. Portions of the facility utilized non-reinforced load-bearing masonry.

The large gym and the auditorium completely collapsed. The roof and windows of most of the second floor classroom area were demolished. A fire developed in a second floor chemistry storage space. No one spotted the storm as there were few west-facing windows. Students and staff found "shelter" throughout the facility. The bleachers significantly reduced the wind pressure on some west facing non-reinforced masonry walls, providing unexpected "shelter".

Plainfield Administrative Services Building

(F3, 1 death)

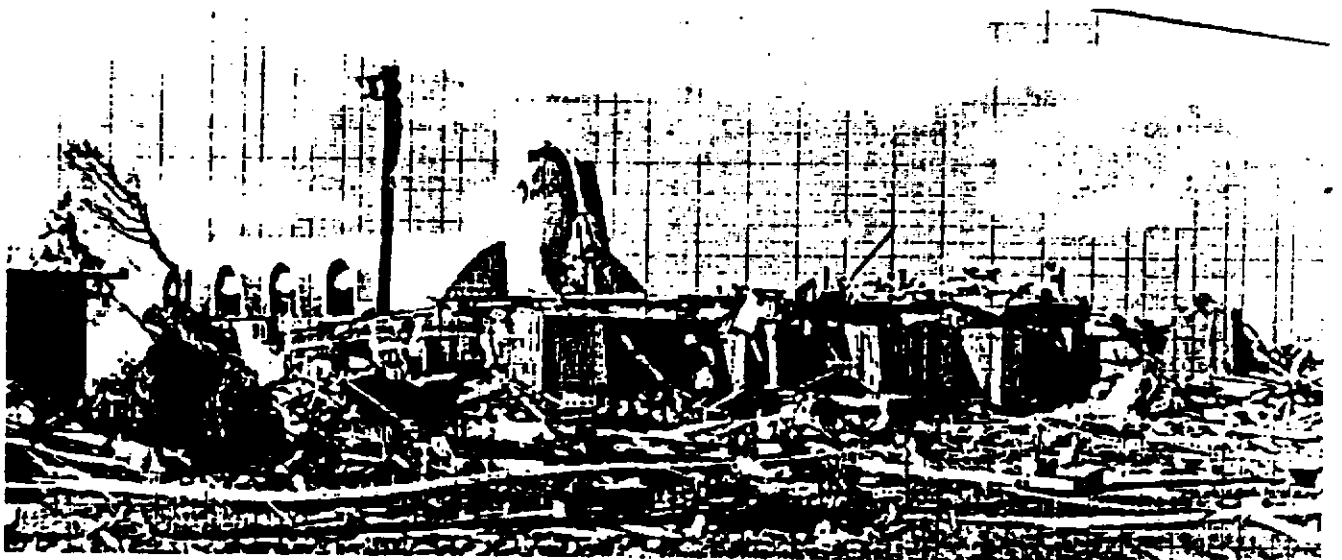
This approximately 10,000 square foot facility contained the school district offices and central storage. Most of the approximately 30 people present were in a planning meeting. Recognizing the deteriorating weather conditions, the meeting was stopped. The occupants headed for an interior records storage space.

The structural system combined steel framing with exterior load-bearing masonry. The office and conference spaces utilized demountable partitions. Concrete masonry partitions surrounded the toilets and records storage spaces. Two large exterior roll-up doors faced west.

St. Mary Immaculate Catholic Church

(F2 ???, no deaths)

This unusual church building was oriented east-west. The church seated approximately 1000. Its heavily reinforced concrete vaults and steeple resisted a direct hit. Its curved, intersecting forms combined with pressure release points (windows and skylight) minimized structural damage. Demolition took longer than expected due to amount of steel reinforcement.



St. Mary Immaculate K-8 School

(F2 ???, 2 deaths)

This school building was oriented north-south. It contained 8 classrooms, library, computer room, offices and a multipurpose (gym, assembly, etc.) space at its north end. Two modular classrooms (kindergarten and music) were sited west of the multipurpose space. The air-conditioned music classroom was the location of a staff meeting earlier in the day. The staff were scattered throughout the building when the storm hit. A pole-mounted tornado siren was within 20 feet of the building. Due to a power outage and the lack of an announced "tornado warning", the siren did not sound.

The modular classrooms were totally destroyed. The multipurpose room and adjacent office and support spaces utilized steel joists on stacked bonded load-bearing masonry. They totally collapsed. The classroom portion utilized steel framing. It had a 3' high clerestory into an interior library. The steel frame remained intact. Closed classroom doors remained in place. Those present in the library survived.

Expected observations:

- Thunderstorms spawn tornadoes. A tornado is usually at the end of a thunderstorm.
- Tornadoes damaged before "Tornado Warning" was announced.
- Tornado sirens did not sound.
- Curved building forms received much lesser damage
- Exterior windows became missiles into the spaces.
- Unreinforced load-bearing masonry collapsed, especially stacked concrete block
- Interior spaces such as hallways and rooms offered significant occupant protection
- Light-weight modular structures were totally demolished.
- Sometimes the "best-available" shelter was unable to prevent serious injury.
- Glass block was extremely wind resistant
- Closed doors offered significant wind resistance

Unusual observations:

- Intense tornadoes came from the northwest.
- The tornado was unable to be spotted from buildings
- Tornadoes hit the same place twice. (eight years apart)
- Wedge-shaped bleachers provided significant shielding to nearby building
- Steel columns (WF) with masonry infill collapsed
- A building fire was caused by a tornado. (the only building fire that I'm aware of)
- Car became an airborne missile.