IV. HOLY CROSS HOSPITAL

a. Structure and Damage:

Holy Cross Hospital was owned by a non-profit corporation. Its construction started in 1959, and its certificate of occupancy was issued in March 1967. The main building contained 209 beds and consisted of a seven story building with appendages of one, two, and three stories, non-symmetrically located around the main building (Figure 7).

The building was a reinforced concrete shear wall structure, with floor framing of pan-joists and beams, constructed of light-weight concrete. Shear walls were provided by the elevator core, staircase walls and additional shear walls at the short ends of the building and internally in the transverse and longitudinal direction. However, not all the shear walls ran full height and those at the short south-west end were omitted in the first and second floors.

The principal damage occurred in the second to fourth stories with the worst damage on the third floor. The most visible damage was at the third story level of the east and west ends. Above the fourth floor there was essentially no structural damage, though nonstructural damage was extensive.

Exterior columns in the north and south sides were extensively cracked, particularly in the third and fourth stories: the concrete in the exterior south-east corner of the fourth story was shattered, and there was a massive failure at the fourth floor construction joint.

Some of the columns at the ends of the building and columns in the three story appendage to the building failed in shear with extensive cracking. The three story north appendage had its third floor supported on free standing columns and was attached to the third and fourth floors of the tower. It was probably this configuration that caused the extensive damage to the third and fourth stories of the seven story tower. The second story free standing columns in the north wing were badly cracked, the abrupt change of stiffness at the second and third floors creating a weak-column, strong-beam configuration.

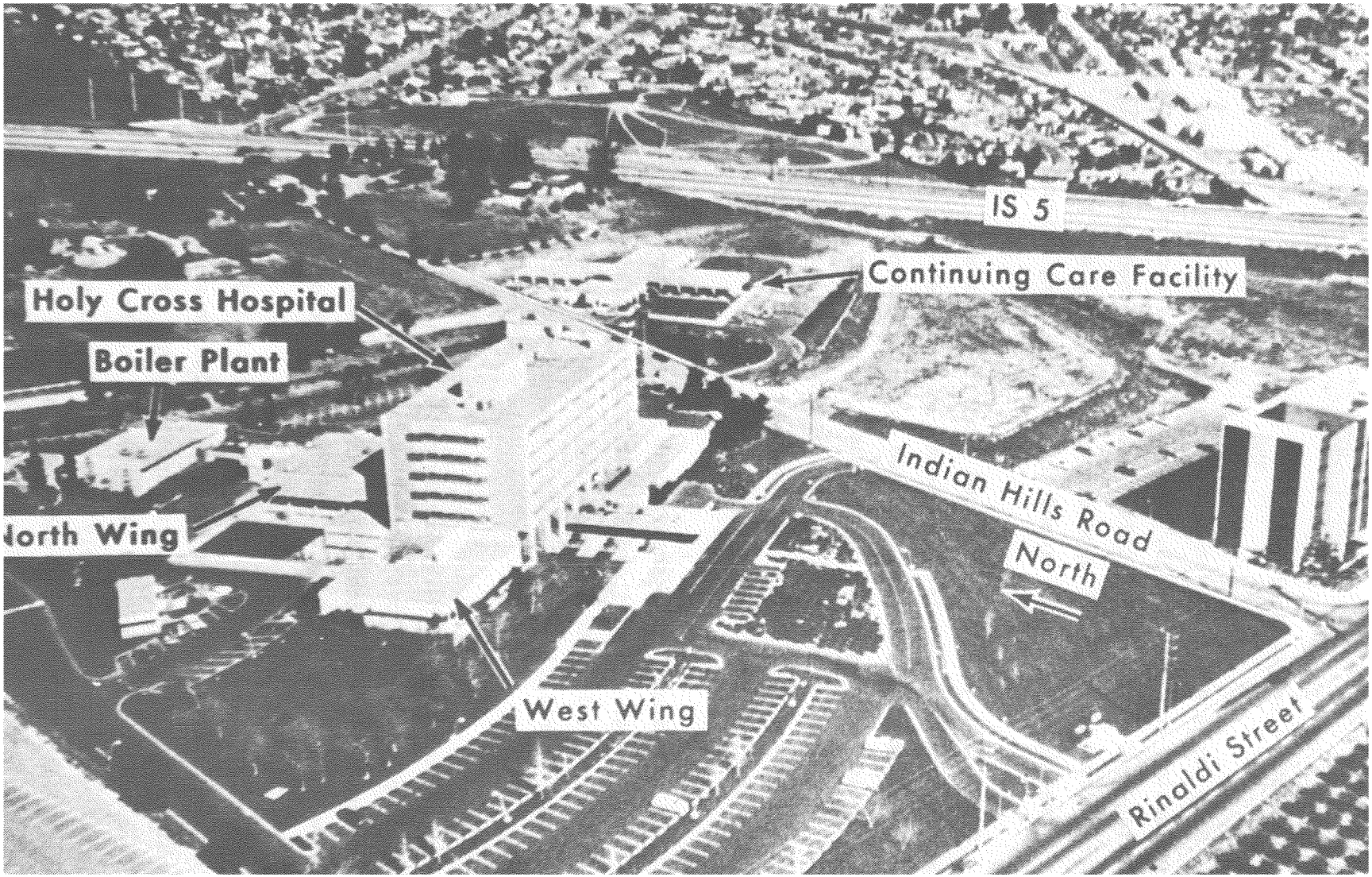

Figure 7: Holy Cross Hospital before the earthquake. (Photograph from: Lew, H.S., "Engineering Aspects of the 1971 San Fernando Earthquake," National Bureau of Standards, Washington, D.C., 1971.)

Although the structural damage was considerable, the building was not close to collapse and extreme distortion did not take place. The combined loss of the building and equipment was estimated at 55% of a replacement cost of $9 million. In fact when the replacement hospital was completed in 1977 the approximate cost was $24 million, including $2.5 million for moveable equipment. There were no deaths or injuries at the hospital.

b. Selective Chronology:

5:58am

- Nurse George, Assistant Director of Nursing, checks on patients in Emergency Room on first floor.
- Pediatric Nurse Doherty checks only child in isolation on 4th floor.
- Nurse Farias prepares patients for surgery.

After Q

- Nurse George checks upstair floors by intercom. Patients visited by staff and re-assessed.
- Rubble cleared from stairs; exit route established. Lights flickering.
- A large number (50) of civilian volunteers arrive.
- A military doctor driving by on freeway stopped to help in Emergency Room.
- Helicopter brings in 6 Olive View open heart surgery cases before it is realized Holy Cross is in no condition to accept patients.
- Phone service continues for a while: later, all communication by runners.

Q + 15 minutes

- Nursing staff succeeds in calming patients.

Q + 25 minutes

- About 300 injured people from surrounding area begin to arrive.

Q + 1½ hours

- Decision to evacuate.

Q + 3½ hours

- Everyone either out, or in undamaged rooms on first floor.