shear walls on the first floor. The cracks were mostly diagonal trending, as shown in Figs. 7.20 and 7.21. The cracks often followed the mortar lines, but occasionally passed through the concrete blocks themselves. Most of the cracks extended through the entire thickness of the wall. Extensive cracking of the headers of many doorways was also observed.

The cracking was noticeably more severe in some places than in others. In one such severely damaged portion, several damaged concrete blocks were chipped away with a hammer to expose the internal reinforcement. It was found in some cases that no grout was in place to bond the reinforcing steel to the concrete blocks, as shown in Figs. 7.22 and 7.23, resulting in an unexpectedly weak shear wall. Further investigation occasionally revealed such additional deficiencies as missing or misplaced steel, and inadequate laps and splices. In these severely damaged areas repairs consisted of complete removal of the concrete block shear walls, and replacement with new reinforced concrete shear walls. Sixteen walls required replacement. In other locations repairs will be accomplished by epoxy injection.

The damage to shear walls in Santa Cruz Residence Hall was very similar to that in Anacapa Residence Hall.

Engineering Building

The engineering building consists of a five story unit which is connected to several one story units on three sides. Plan dimensions of the five story unit are 70 feet by 250 feet, and it is a reinforced concrete shear wall structure. A basic floor plan of the structure is shown in Fig. 7.24 where the broken lines indicate the single story units and the solid lines indicate the five story unit. Also shown on the floor plan are the locations of the shear walls, and of the exterior and interior columns. The structural details of the shear walls are given in Table 7.3.

Photographs of the structure are shown in Figs. 7.25 and 7.26. The one story units are not symmetrically located with respect to the five story unit, and the concrete roof of the one story units is two feet below the second floor of the five story unit. The one story units are also reinforced concrete shear wall structures.

The design of the Engineering building was governed by the 1961 edition of the Uniform Building Code. The minimum compressive strength of the concrete mix is 2500 psi in the footings and one story units, 3000 psi for the walls, beams, columns, slabs, piles and caps, etc., for the five story unit, and 5000 psi for certain columns in the five story unit. The exterior columns and some exterior shear walls contain concrete blocks which have minimum compressive strength of 1200 psi. The structura steel meets the requirements of A.S.T.M. A-36.

The earthquake caused significant structural damage to the interior shear walls in both the north-south and east-west directions. Very little cracking occurred in the exterior shear walls at the ends and center stair tower. Although the cracking was more extensive in the lower stories, the north-south interior shear wall sustained significant

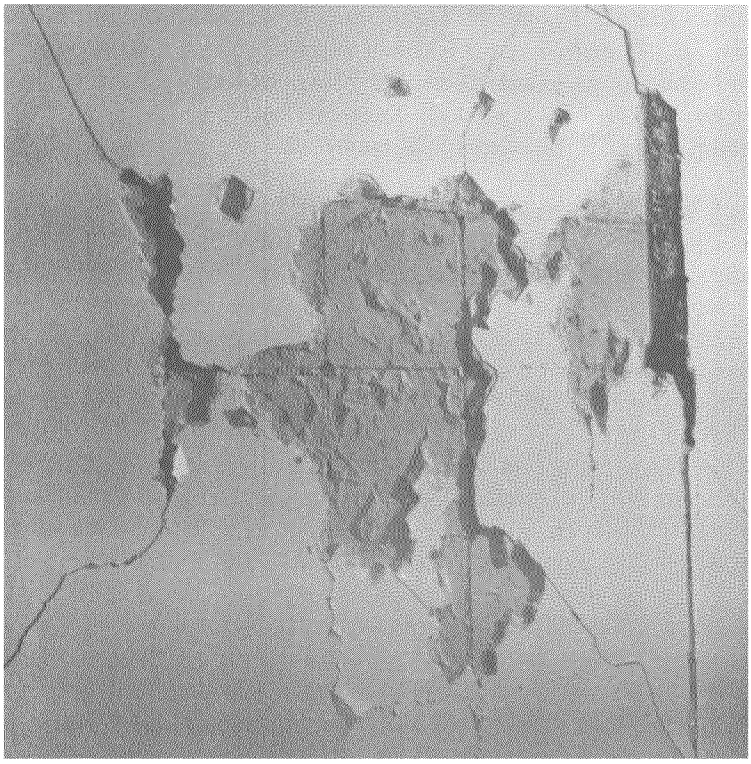

Fig. 7.20 Diagonal cracks in north-south shear wall in first story of Anacapa Residence Hall.

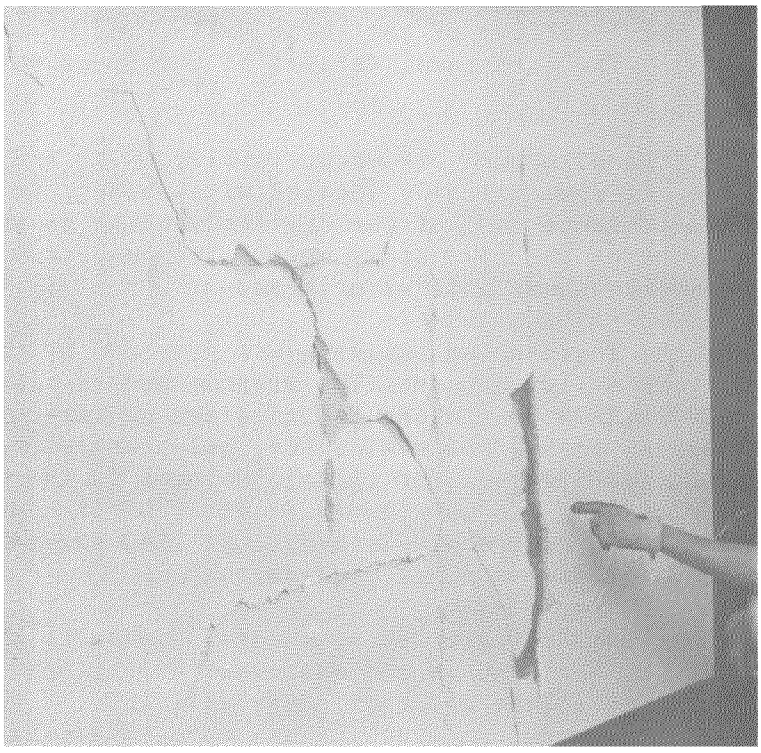

Fig. 7.21 More diagonal cracks in north-south shear walls in first story of Anacapa Residence Hall.