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PROBLEM: HOW DOES CONCRETE RESIST FORCES?

I. Concrete is strong in compression but weak in tension. Its tensile strength is about 10% of its compressive strength. A 4000 psi concrete will only have a tensile strength of 400 psi. A 6 inch by 6 inch column 12 inches high will carry a compressive load of 144000 pounds but only 14400 pounds in tension.

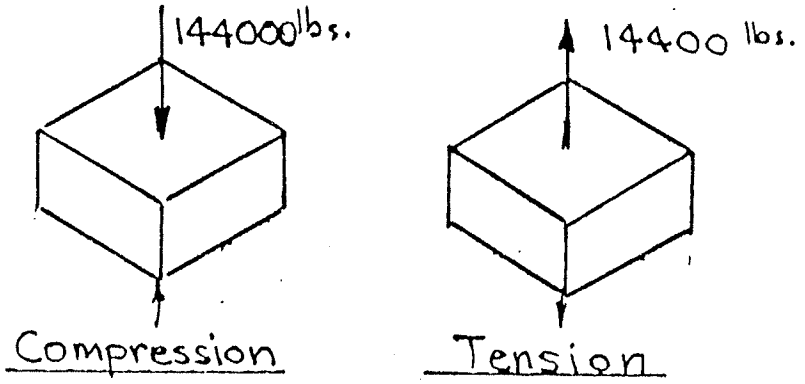

fig. 3-1

II. A concrete beam will experience tension in the bottom half and compression in the top half. Since the concrete has some tensile capacity, the beam will carry a small load.

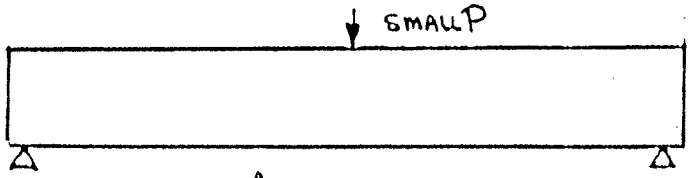

fig 3-2

When the load is increased, the tension in the bottom half of the beam is increased. At some point, the tensile capacity of the beam will be exceeded and failure will occur.

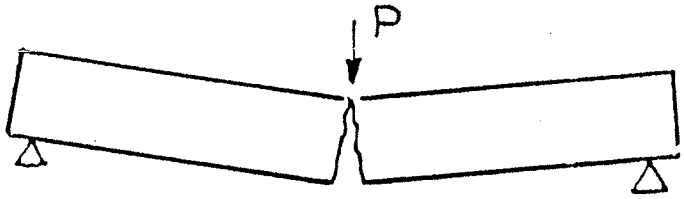

fig 3-3

Steel is a material that has good tensile strength. If steel is placed near the bottom of the beam, it can carry the tension after the concrete has reached its tensile capacity. The steel will not be in tension until a crack develops. It just sits in the concrete ready to go to work.