Reaction backing shall be provided for all plugs, caps, tees, and bends deflecting 22-1/2 degrees or more on mains 8 inches in diameter or larger and for the bowl of each fire hydrant. It shall consist of Class E concrete, Item S-1, placed between the fitting or hydrant and solid earth in sufficient amount and in such a manner as to prevent movement or displacement of the fitting or hydrant. The backing shall have a cross sectional area of not less than one square foot.

(c) Hydrostatic Testing. After the pipe has been laid, it shall be partially backfilled (except at the joints) as specified under (d) Backfilling.

Where any section of a main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five days after the concrete is placed.

After the main has been slowly filled with water in preparation for the hydrostatic pressure test, all air shall be expelled from the pipe. If fire hydrants or blow-offs are not available at high places, the Contractor shall make the necessary taps at points of highest elevation and insert the plugs after the test has been completed.

Alternate A. A test pressure of 50 per cent above the normal operating pressure, but in no event less than 100 pounds per square inch, based on the elevation of the lowest point of the line and corrected to the elevation of the test gage, shall be applied and maintained for a sufficient length of time to allow for a thorough examination of the joints and elimination of leakage where necessary. Any cracked or defective pipes, fittings, valves or fire hydrants discovered in consequence of the pressure test shall be removed and replaced by the Contractor at his own expense. The line shall be absolutely tight under the test pressure for a minimum of one hour.

Alternate B. As an alternate to the preceding method, the Contractor may choose the following procedure.

The water main shall be tested under the same hydrostatic pressure as previously noted. The test pressure shall be maintained for a period of two hours by pumping additional water into the main and measuring the amount necessary. One half of the quantity of water thus pumped into the main shall be taken as the leakage per hour.

No section of main so tested will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{1850}$$

in which L is the allowable leakage in gallons per hour; N is the number of joints in the length of main tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure in pounds per square inch gage.