BREAKS IN IRRIGATION PIPING

The following information was contributed by Scotty Stewart to shed some light on the severe problems some superintendents have experienced this past year.

Numerous superintendents have reported that when they turned the water into their irrigation systems this year they found many breaks in the pipe lines, some having 50 or more breaks in the system. Although the majority of breaks appear to be confined to plastic or asbestos-cement pipe, reports have also come in of breaks in steel and cast-iron pipe.

Nearly all of the breaks can be traced to frost action for it will be remembered that we had very little snow in the Chicago area last year and in some instances the frost entered the ground to a depth of four feet, even as late as May 1st of this year the writer has a report of frozen soil being encountered at a depth of three feet.

In as much as almost all irrigation piping is located between one to three feet below ground level and is layed to grade so it will drain free of water to low points terminating in a drainage outlet, it will be seen that most of the piping was encased in frozen soil.

When soil freezes the moisture held between the soil particles also freezes, and as water in the form of ice increases in volume about 8.5% a heaving effect in the soil takes place, this effect also heaved the pipe and broke a lot of it for certain pipe materials are quite brittle when subjected to a freezing temperature. When we realize that ice at 12 degrees F. has a crushing strength of **1070 pounds per square inch** it is easy to imagine the tremendous upward pushing power that was exerted on the pipe.

Some of the pipe breaks also came from contraction for all pipe materials expand or contract with changes in temperature. For instance plastic pipe contracts 2 inches per 100 lineal feet, or 20 inches per 1000 lineal feet, when the temperature is lowered by 50 degrees F.; cast-iron or steel contracts about one-sixth of this amount, or 3½ inches per 1000 lineal feet under similar temperature conditions. Where adequate expansion joints were not provided in the pipe line many pipes just pulled apart.

In some cases where we had the chinook weather effect in January when the surface of the ground thawed out and permitted surface water to run into the line through flush type pop-up nozzles this water of course froze in the underground pipe and undoubtedly caused some breaks; this certainly brings up an additional problem in the design of automatic systems where a few hundred flush type pop-up sprinklers are used, some type of gravel or French well should be provided around each pop-up head to take surface water rather than let it build up and run into the sprinkler nozzles.

It should be remembered that plastic pipe, when subjected to a freezing temperature becomes quite brittle and breaks easily. Asbestos-cement pipe which absorbs water somewhat similar to a wet blotter also becomes quite brittle when subjected to freezing conditions, this along with the fact that asbestos-cement pipe has only one-seventh the beam strength and one-quarter the bursting strength of cast-iron pipe also accounts for the numerous breaks in this type of pipe material.

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