DISCUSSION OF A PAPER BY W. J. SCHLICK
ON TILE DRAINS AND HIGHWAY CONSTRUCTION IN IOWA

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The topographic and soil conditions in Wisconsin are considerably different from those of Iowa so it little behoves us to criticise what the engineers may be doing in Iowa. Our soils range from a drifting sand in the south central part of the state, through various stages of light and medium heavy soils to extremely dense impervious clay. This clay covers a considerable area through the Fox River Valley and along the northwestern section of the state. No effort will, therefore, be made to take exception to anything the paper states relative to the practice in Iowa, except insofar as it applies to Wisconsin conditions.

Formerly, that is ten or twelve years ago, it was common practice in Wisconsin to use considerable tile, but not to the extent that is now practiced in Iowa and parts of Minnesota. In all cases where live water, or what is commonly called springs, was encountered, it was and still is the practice to put in tiles. Under macadams and gravel construction it was the practice to use so-called French drains in practically all cases and in many cases drain tile. This was put in in several ways, - the so-called Fish Bone type and in other cases a line or lines parallel with the road.

We tried various kinds of tiling in Milwaukee County under concrete paving, making a careful selection of the places to be tiled. After ten or more years, you cannot see any difference between the pavement on the tiled and that on the untiled sections, one being as bad or as good as the other.
On flat or swampy places it was formerly considered that tile was most necessary. Our experience has shown otherwise, especially with relation to paved roads. The thing that is desired under a concrete pavement or any other hard surfaced road is uniformity. While swamps may be wet, they are uniformly so and the road all raises and lowers together. Our experience has shown that a road built on swampy ground may be difficult of construction in the first place but when once built, will break up much less than one built on a rolling topography. In fact, it is very seldom that we find a longitudinal crack in a swampy job. To illustrate, we had a job in 1920 that called for 7,000 feet of tiling, but this tiling was omitted and today one cannot find a longitudinal crack in this road. We believe that the time is coming when some effort will be made to treat the subgrades under pavements in order to make the bearing more uniform. We believe this can be done in some way better than by tiling.

One of the greatest troubles from frost action in a paved road has been the development of longitudinal cracks. This has been overcome by building a longitudinal joint into the road. In other words, hinging the road so that the road can respond to the frost action and return to its normal position when the frost leaves the ground.

As Mr. Schlick says "Heavy soils are little benefited by tile drain". We found this very true in our heavy clay soils. The sandy soils need no tile. The worst combination we have is an occasional piece of sand surrounded by impervious clay. Where we find this condition tile drain is placed as well as where we find live water. We have found several reasons why the tile fails after a period of years. Frost action may break down one or two sections
of tile, thus clogging the drain. Roots are a common trouble just as in sewerage construction. In addition we have the further trouble of rodents using them as nesting places. Another cause was improper construction or frost heaving, causing low places in the system which became filled with sediment.

There have been a number of theoretical tests made on tile drain for road purposes, the most recent perhaps being the Bates Road Test made in Illinois. This test was carried on in great detail showing no benefit from tiling insofar as the life of the concrete was concerned. Moisture tests, thousands in number, show this and in many cases the tiled portions show more moisture than the unlined. The engineers in charge of these tests, which were made on black Illinois soil, report that in their opinion the tile was of no benefit to the road. Practical tests, or in other words, tests over a series of years, show practically the same thing. The state of Massachusetts was formerly one of the greatest users of tile in highway construction. On a recent visit of one of our engineers to that state, the old engineers reported that practically all of the old tile had gone out or long since lost its value. A similar report was had in New York and Maine and as a result, tile has gone out of use in these states except in the case of live water. While the Wisconsin experience had not been as extensive as that of these older eastern states, still the results have been about the same. On our gravel road construction which has been built without French drains or tiles, we have had some upheavals due to frost action but not enough to warrant extensive tiling.

There is no argument but what the removal of surface water is beneficial, especially in the spring. Whether this water is removed
from tile drains or by some other scheme makes no difference. If the
tile is so arranged as to remove this water, then the tiling is
certainly beneficial but that is not necessarily saying that tiling
is the only way to remove this water.

In conclusion we would state that we have no desire to criticize
what is being done in Iowa but do wish to leave the impression that
Wisconsin experience is quite decidedly against the use of extension
tile in highway construction.

Editor's Comment: It is hard for one on the side line to believe
that tile should be 90½ right in Iowa and 99.44½ wrong in Wisconsin.

Granting that concrete pavements are standing up on marshes be-
cause the heaving is uniform, we believe that in deep cuts a line of
tile under one or both shoulders would regulate the seepage, make the
heaving uniform, and prevent cracking of the pavement. Granting
also that there are some soils so tight that tile have difficulty
in extracting the damaging water from them, we know that most of the
soils in Wisconsin have so called "live water" in them that tile can
and do extract. Every drop thus extracted means more uniformity in
heaving and less damage.

We are proud of the engineers in our highway department. They
have given our highways good drainage. But we believe that a line
of tile under the uphill shoulder of the road will cut off the seep-
age at the foot of a hill in Richland County, for example, more
cheaply, permanently and safely than an open ditch 3 feet deep. Such
a ditch is a menace to traffic and has to be cleaned out every year.
Let's get together and do some more experimenting along this line.