water very soon undermines them, allowing the walls to fall in, in which condition they are usually allowed to remain, until complained of by some one who suffers by their condition. Then some one, who generally knows little about them, is entrusted with their reconstruction, and no improvement is effected. They are usually much shorter than the width of the road, leaving dangerous holes at the ends. Moreover, they are not economical, decaying, as they do, so rapidly from the alternate wetting and drying to which they are subjected. The cost in this township of culverts in repairs alone for the year 1884 amounted to $358, a sum which does not include any new ones built.

Of the bridges—five in number—maintained by the township I need say nothing, as they have been well and properly built by competent engineers, and are models of their kind, except that I think it poor economy to build wooden structures when stone is as convenient as it is in this township.

To effect an improvement in the condition of these roads, thorough drainage of the road-bed is a prime necessity. This can be provided by an open drain on each side of the road, with side slopes of one to one and a width of one foot in the bottom. The slopes should be sodded or sown with grass seed to keep the clay from washing down. The earth from these drains should be used to level up the sides of the road. These drains will carry off all the surface-water of the adjacent soil, and prevent it from percolating through the road-bed.

Where the road-bed is spongy or inclined to be springy, cross-drains should be put in. Where there is no longitudinal slope to the road-bed these may be put in at right angles to the side drains; but if they are put in on a slope, they should be of the form of a broad letter V, with the angle pointing up the slope.

They should have a fall of one in thirty to one in one hundred, and should empty two inches above the bottom of the side-drains.

Another suitable style of underdraining is to put in longitudinal drains, with cross-drains leading to the side-drains. Two of these will be sufficient, and should be equidistant from the side-drains and from each other.

They may be made of tile, brick, or stone. The ordinary one and a half inch or two inch draining tile will be sufficient, and where they can be obtained conveniently will be found to be the most economical, and give good satisfaction. A covering of straw or leaves on them before the clay is put on will act as a filter, and prevent the clay from washing into the tile. With a fall of one in one hundred, a one and a half inch tile will discharge 12,000 gallons of water, and a two inch tile 22,890 gallons per day of twenty-four hours, which is considerably more than will ever be required of them in the sub-drainage of roads. H. F. French, in his standard work on farm drainage, after a careful estimate and comparison of stone, brick and tile, concludes that "drainage with tiles will generally cost less than one half the expense of drainage with stone, and will be incomparably more satisfactory in the end."

As tiles are easily damaged by the action of frost, their ends should not be left exposed, but the last two or three feet of these cross mitre drains should be finished with a blind drain of stone, made by throwing the stone in loosely. Surface drainage of the road is provided for by the slope given to the road, as will be described further on.