

ENGINEERING DEPARTMENT

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Highway Culverts.

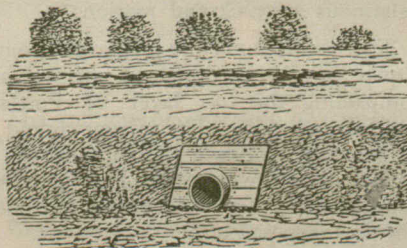
At this season of the year municipal authorities are actively engaged in examining the condition of public roads in the municipality to determine what repairs are necessary to put them in a proper state for the season's travel, and, as is usual, particularly after a severe winter, we find that a very large proportion of the estimates is for the repair and re-construction of timber culverts, which have only been in the ground for a short time, but which cannot under the varying conditions of wet and dry to which they are exposed last very long, the cost of this apparently small item in the affairs of the township, if closely examined will be found to enter largely into the outlay for the year, and is annual, the construction of these culverts in a permanent manner so as to get rid of the repeated demand of repairs and renewal is one worthy of immediate attention.

The use of sewer pipe for road culverts has now ceased to be an experiment, they are very generally and successfully used for the purpose, and the old box culverts of timber are now fast becoming a thing of the past. Although the cost of the sewer pipe is usually a little more than timber, the difference is soon made up in saving the cost of repairs. Timber culverts are continually getting out of order, requiring considerable watching and repairs in order to keep them in a serviceable condition, and, at best, their life is only a few years, while well burned vitrified pipe of a proper thickness, once properly laid needs no further repairs, and experience shows that it will last for a great number of years. It too frequently happens that when township councils order the construction of culverts under roadways the pipes are brought on the ground, the contract is let to the lowest bidder, who invariably has no experience in such work, and the ditch is dug to the required depth to carry the water from the channel above, and the workmen place the pipes, may be with the hub down grade or in some cases the centre of the ditch slightly lower than the outlet and in this slovenly way results are very unsatisfactory and certainly an unfair and unjust test.



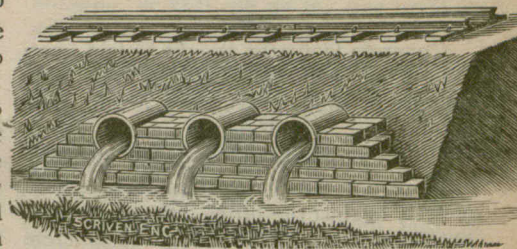
The bottom of the trench should be rounded out to fit as nearly as possible the curve

of the pipe from the lower surface up to the horizontal centre line; then cut little depressions in the bottom of the trench to fit the sockets so that when the pipe is laid its entire lower surface from end to end will rest solidly on the ground. If the ground is soft or sandy this cannot be done but the same result may be obtained by careful ramming the loose earth under and around the lower surface of each section of pipe up to its horizontal centre line after it is placed in position. In order to prevent the lodgement of the debris in a culvert or filling with water, or ice in winter, a culvert should be built with a low fall, the pipe should be laid with the hub or flange up grade or towards the inlet. When this is done properly it is a matter of no consequence how high the bank is above the pipe for it cannot be broken by the weight of the earth. If the bank is solid and not likely to cave or slide, the end of the pipes will not require to be protected, if not, then an abutment of same sort should be made to receive the end of the tile and the foundation of this should extend far enough into the ground to be below the influence of frost, as otherwise the alternate heaving and settling might throw the end of the pipe out of position.



These abutments should extend up high enough to protect the bank at times of heavy rains or overflows from undermining. When stone or brick abutments are too expensive a good and cheap substitute can be made of plank by setting them on end, deep enough in the ground to hold them in place and fitting them carefully about the pipe or still better by setting posts on each side of the pipe and spiking the planks on horizontally. When planks and posts are used it is advisable to set them with considerable inclination towards the road-bed to prevent the pressure of the embankment from crowding the planks outward. The joints of the pipe should be put together with good cement, care being taken that the inside of each joint is scrapped out when cemented, in order that no cement will be left projecting into the pipe, which, when it hardens, will help to check the discharge and collect debris.

The culvert should have a good fall when it is subjected to severe frost, and so constructed that it will drain itself, for, if the pipe is allowed to stand partly full of water, as would be the case when no proper outlet was made, the expansion of the water when freezing is liable to burst the pipe if the water rises in it more than enough to half fill it.



When required, two or more pipes may be laid side by side, should the capacity of one not be sufficient, or, if in case of altered circumstances the capacity of the culvert may require after a time to be increased, additional pipes may be laid to meet the increased demand. In such cases the pipes should be placed far enough apart to secure a solid bed for each. The best pipe should be used in the work and care should be exercised in putting them in, if this is observed the result will be satisfactory. It is a mistake to purchase second class or culled pipe for this purpose as is sometimes done.

ROAD REFORMER.—An eminently practical suggestion is offered in reference to the subject of road reform. There is only one way to get good roads, and that is to build them and then pay for them. This goes straight to the heart of the matter. There are, to be sure, different methods of road-building which may properly be weighed against one another, but the only practical test is that of use and wear. Everybody who uses a road the year round knows whether it is good or not. The question of good roads is a question of the willingness of the people to go to the expense of having them. Let them once be provided and the community enjoying the blessing would not soon cease to wonder how it managed to get along without them so long.

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The fishermen readers of THE WORLD will be interested in the latest device to catch fish, it is an annealed flanged flint glass tube with a stopper that can be easily removed to receive live bait, including minnows, crabs, frogs, angle worms, etc. The tube is strong and not liable to be broken by the fish that are caught. At each end of the tube is a small aperture to allow sufficient water to pass through it to keep the bait alive, while the sides of the tube are so constructed as to magnify the contents. This device does away with the minnow pail, and its attendant annoyances as the bait is kept alive without injury and perfectly good for a whole day's fishing. The hooks are Limmerick make, silver plated, with white swivel and white wire leader, so that nothing is seen passing through the water but the live bait attractively and proportionally magnified. Calvin V. Graves, Natural Bridge, Jefferson county, N. Y., is the proprietor and the prices are \$1, \$1.25 and \$1.50.