

"Sewer Maintenance; Under Whose Supervision and Why?,"
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Sewer Maintenance; Under Whose Supervision
and Why?

Extracts from a paper presented to the American Society of Municipal Improvements by John H. Emigh, City Engineer, North Adams, Mass.

The object to be sought in the maintenance of sewers is to provide at all times for an unobstructed flow of the sewage, to prevent solid matter from logging along the main line or its laterals, and to secure good ventilation. Neglect of the first is likely to result in a set-back into house fixtures and an overflow at their lowest outlet. Neglect of the second leads to decomposition and the attendant offensive or dangerous gases; and of the third to an increased pressure of those gases until they are forced through the house traps and into residences. Only about 1 ounce pressure per square inch is sufficient to force the seal of an ordinary house trap; and I suppose that in every city there are many residences whose plumbing is of the older methods and is practically without ventilation. This means that when sewer gas has once entered the house it has no means of escape other than through fixtures into the rooms.

The first requisite for successful maintenance is good construction. This consists in having proper foundation, thorough tamping about the body of pipe in back-filling, imperviousness of joints, uniformity of grade and good alignment between manholes or lantern-holes, easy curves and smooth flow surfaces at the manholes, frequent Y branches for connecting house laterals, all with a plan and profile containing a clear and reliable record of location, depth, grade, position of Y's and other sewer adjuncts and sometimes the proximity of water or gas pipes. The designer and the inspector have always to contend against a disposition towards cheap construction—a tendency to use an easy way around difficulties because, no doubt, of the belief that, when covered, a critic's eye may not see the faults, and, too, of the possibility that he who causes them may not have to suffer from their results.

The ideal conditions that should be striven for are those that will cause all matter entering the sewer to be delivered so quickly at the final outfall that there has been no time for decomposition. These conditions very rarely if ever exist in any extended system.

The second requisite for good maintenance is systematic vigilance. It is injudicious, expensive and the cause of much annoyance or damage to neglect the sewer until it has become stopped, and the only way to avoid such a condition is to take proper precautionary measures which should include regular examinations at not too great intervals. There is probably no more efficient and economical method of keeping the sewer clean than frequent flushing.

Manhole covers should be placed flush with the surface of the street both for convenience and as a means of ventilation.

Laterals entering from factories and similar buildings should be provided with some arrangement for keeping from the sewer anything that is likely to form in it an obstruction. A piece of cloth, 20 yards in length, late from the loom, or a piece of 4-inch belting 10 feet long found within the sewer are indications that some people are indiscreet. I know of no better provision for such places than a manhole near the outside of the building, its bottom made slightly below the outlet, enough so that the discharge is made first into a quarter-turn, opening downward. This works very well, it keeps the outlet opening always submerged and acts as a trap. It is objectionable in that matter accumulates in the manhole and may need occasional cleaning out, but it is probably less objectionable than the usual form of connection.

In a combined system or in the surface water sewer of a separate system there is frequently an accumulation of gravel or street dirt that greatly reduces the capacity of the sewer or stops it entirely. Too often this condition is not known until there is a heavy shower and the sewer refuses to do its work. There is great liability to trouble of this sort wherever the higher parts of the system are in dirt roads and along steep hills. The strong wash along street surfaces carries gravel and sometimes stone beyond the catch-basin trap into the sewer, thence to the flat grades where the reduced velocity allows them to stop and accumulate. These places of accumulation should be watched and frequently attended to. If taken in time the obstructions may generally be removed by a strong stream of water obtained by a direct connection with the street main as already described or through a line of hose attached to the nearest hydrant. Sometimes a heavy chain with knots in it may be drawn either way in the sewer, thus loosening the material that has been deposited. Much of this may be taken from the next manhole below if a shoveler is kept constantly at work and the water is made to flow over a blocking which covers the lower half of the outlet of that manhole. When the sewer is large enough so that men may conveniently work inside it becomes simply a case of shoveling the material and conveying it out by an arrangement that best suits the conditions.

When the sewer is entirely stopped the problem is one of greater difficulty. No rule can be set down for its treatment and the solution must be as the case requires even to the taking up of a portion of the street, if necessary. Ordinarily the obstruction must be worked at from the manhole next below. Sometimes a sewer may be probed for 200 or 300 feet by a rod made up of sections, either in wood or iron, each 3 or 4 feet in length, joined at their ends by Felton's improved coupling. These constitute a convenient arrangement and may accomplish the purpose in small sewers of from 8 to 12 inches in diameter. Sections made of wood are light and easily carried about. A stronger rod and one capable of greater length may be made of $\frac{1}{2}$ or $\frac{3}{8}$ inch iron pipe, cut in sections of the same length as above described and fastened together by screw couplings. This with hook or claw at the end is likely to accomplish much better work than the other. It is slower to make up and much heavier to handle than the one made of wooden sections.

A water-jet may, at times, be very useful. Perhaps a mirror may be made to throw sunlight into the sewer and help to determine the location and character of the obstruction.

Whatever the difficulty I believe it is well to keep a tabulated record of the date, character, location, cost of removal and such other explanations as may seem wise, as well as a record of the flushings. They are convenient for reference, they explain accounts, and are likely to be of use to the successor in office.

Cleaning catch-basins is an important item of maintenance and one of the most expensive unless well managed. Hardly another bit of work has so strong a tendency to slowness on the part of the workmen. As suggestive of a good method now being used, I take the liberty to quote from a letter recently received on this subject as follows:

"All catch-basins are numbered and are regularly inspected by a man who records the depth of dirt in each. From this record lists of the basins needing cleaning are made out and given to the cleaners, with the route they are expected to follow. The cleaners make a return each day of the basins cleaned and of the number of loads taken from each. From these re-

turns we obtain a check upon the work each cleaner is doing and are able to obtain the cost per cubic yard of the material removed from the basins.

"When the cost per cubic yard runs above normal figures we detect it and at once investigate the cause. By the adoption of this method we have succeeded in greatly reducing the cost of cleaning (I believe it to be capable of still further reduction), and obtain a record of each basin which is valuable in case of complaints.

"By this method the men do not stop to clean a basin that has 3 feet of water and only 1 foot of dirt but attend to only those basins which need attention. They do not have to be accompanied by a foreman, as the returns show the amount of work done each day."

The same writer says that the cost per cubic yard for removing and hauling away was \$0.665 in the year 1899 and was \$0.68 in the year 1900. The haul was probably about 2,000 feet and the difference in cost probably due to the difference in length of haul.

The manner of connecting house laterals with pipe sewers is a matter that belongs frequently to maintenance and is of considerable importance, especially if no Y has been provided, in construction, for the connection. Cutting an opening through the side of the sewer should not be allowed. Removing a length of pipe and replacing it by another that contains a Y branch is objectionable because with any considerable run in the sewer or with the run turned on before the cement has had time to set is very likely to result in leaky joints. Taking up three or four lengths of the old pipe in order to not be obliged to cut away any of the bells in relaying is open to the same objection. The writer believes there is no better method than to excavate entirely around the pipe and encase it in brick masonry or concrete nearly to its top, then carefully cut the hole in the top of the sewer and join the lateral to this by a quarter of an eighth bend, making sure that none of the smaller pipe extends inside the shell of the larger pipe; then continue the masonry to cover the joint thus made. This, if properly done, does not weaken the sewer, nor cause it to leak or become rough on the inside. It may reduce somewhat the grade of the lateral but this it should be able to stand or the elevation of the fixture is dangerously close to that of the sewer.

The laying of house laterals is probably more faulty than that of any other part of the system and is, in consequence, the place of more stoppages. They are frequently laid without supervision, by contract and at the lowest price. There is no reason why these should not be placed, by the city, under the same supervision and restrictions as other parts of construction. A license to the drain layer does not insure good results.

The third requisite for successful sewer maintenance is a right kind of man to do the work. If the system is large divide it into sections and select a man for each, all subject to the direction of the head of the department. The selection should not be made in accordance with the policy that anything will do. The man should be intelligent, reliable, and have a reasonable degree of common sense. His work is not of an agreeable character but he should have an interest in it and should take pride in doing it well. Very much of his method and what he does may be hidden, so he must have an ability to see what needs to be done and be honest in carrying out instructions. He must, like every other man, in order to do good work, feel that he has a responsibility and is being trusted. The one under whom he works must show that good service is appreciated and must, as far as possible, make use of the subordinate's

judgment. Respect him and let him know it. If he is unworthy of this he should not have the place. Make him feel and know there is as much dignity and honor in well filling his position as there is in filling any other. This, it seems to me, is the only way to get from a man the best that is in him.

The question of maintaining ventilation is a somewhat difficult one, especially in dirt roads. In paved streets a perforated manhole cover seems reasonably satisfactory if the perforations are kept open, but in the dirt road they are very liable to become stopped; yet there seems to be no better method even here. To obtain good results they must be watched and frequently cleaned. A 4-inch pipe connected with the drain just outside the running trap of each house and running to a point above the roof no doubt provides a first class ventilation for the sewer and protects the house from sewer gas as much as is possible. Its expense makes it somewhat objectionable and if carried up in a conspicuous place it is unsightly. The necessity of good ventilation has already been mentioned.

Under whose supervision should the maintenance of sewers be placed? This can not be answered by the man's municipal title. He should not only be competent to design and construct but he should have had experience in it. A knowledge of the theoretical and the practical are most desirable qualifications for supervision of maintenance. He should not only be capable of reading drawings but of making them. He should know when to make them and of what. He should be most familiar with the system and should be able to decide quickly what should be done for the difficulties that are likely to arise. He should attend to a clear and concise record of the work done kept in a form convenient for reference. Finally he should be able to establish a cooperation with his men and a condition of mutual confidence. At the same time he must be master of the situation and must see that his orders are obeyed.