PROTECTION OF STEEL GIRDERS FROM SMOKE.

The problem of protecting steel work from locomotive smoke has been coped with by the city of Baltimore in an unusual but, up to the present, satisfactory manner. The city engineer, Mr. H. K. McCay, gives a brief description in "Municipal Engineering" of the method followed to protect the steel viaducts directly over railroad tracks throughout the city from the detrimental influence of the gases and cinders from locomotives.

The city of Baltimore is divided by a stream of water which flows from the northwest to the southeast through the most populated districts of this city. The various railroads have utilized the valley of this stream for the purpose of ingress to and egress from the city, laying their tracks along and parallel therewith. Union station, used by the Pennsylvania, Western Maryland and Northern Central railroads, is practically on the banks of this stream. In order to carry the north and south streets in Baltimore across this stream and across the railroad tracks it was necessary to construct at a great deal of expense, five bridges, namely: Guilford avenue, Calvert, St. Paul and Charles streets, and Maryland avenue. Most of these bridges span the railroad tracks at a height which prevents the gas from the engines destroying the steel, but on two bridges, namely, the Calvert and St. Paul street, the clearance is such that the blasts from the engines destroy any protection that is put over the lower members to protect them.

The Calvert street bridge is a magnificent structure, 62 feet in width, with a total length of about 600 feet. The spans are the bow spring type of truss, and made almost entirely of wrought iron. This bridge was built in the year 1878, and cost approximately $220,000. There is a clear span over the railroad tracks of about 146 feet, and a clearance over the Pennsylvania tracks of 23 feet. The author found, as stated above, that the lower members of this bridge became badly corroded from the gases of the locomotives, as many as five hundred of these engines passing under this bridge each day. It had been the practice of the city engineer's department to paint these bridges each year, either with coal tar paint or with the very best red lead paint obtainable. He also found it was nearly impossible to use the ordinary scaffolding to allow time for the paint to harden, therefore he constructed a closed scaffolding, and swung the same beneath the bridge, cleaned off the lower members very carefully and repainted with two coats of paint, allowing the scaffolding to remain as a protection for a week or ten days until the paint thoroughly hardened. In spite of all this protection, it was found that the paint would not stand the blast from the engines, and the lower members, in order to preserve them, had to be painted each year.

Mr. McCay therefore decided to encase the lower members of the bridge in concrete, and careful computation was made as to whether the weight of the concrete would alter the stresses and strains as calculated for this bridge. He found, by removing some ornamental castings, which were of no vital moment to the bridge, that a comparatively thin coat of concrete could be placed on the bridge without increasing the stress or strain, and, if anything, improve the stability of the lower members, thereby reducing to some extent the vibration.

The lower members of the north span consist of nine built-up steel girders, with a surface area of approximately 5,000 square feet. The specifications called for concrete to be put over these members to a thickness of 1½ inches. These girders were carefully cleaned by means of sand blasting and acids, so that all of the old paint was removed, and the steel surface carefully exposed. Wire mesh reinforcement was carried all around the beams, and a coat of "gunite," 1½ inches in thickness, was applied; the gunite following the contour of these beams. The reinforcement is held away from the face of the steel by means of ½-inch iron rods, as it was found that the channel method was not satisfactory.

The total area, as mentioned above, was about 5,000 square feet for the north span of this bridge, and the contract was let at $1.25 per square foot. An additional area has recently been advertised and the contract let at an expense of 95 cents per square foot.

The grout placed by means of the cement gun proved very dense and thick and there is absolutely no danger of gases from the engines penetrating the steel through this grout and Mr. McCay is of the belief that the city of Baltimore has gotten rid of a very expensive renewal item by the adoption of this method.

NITRITE TEST FOR POLLUTION.

In a paper which he read at the recent convention in Philadelphia of the American Water Works Association, Mr. W. M. Booth outlined his use of the nitrite test in tracing a source of pollution in a supply of drinking water, and endeavored to show from experimental results the relation between the nitrites and the existence of the source of probable pollution in a number of cases of springs, wells, streams and lakes. In the instance in question, the author, who has for some time made accasional analyses of a certain water supply at a matter of record, found the nitrites unusually high, accompanied by high ammonias and colonies of bacteria on gelatine. A simple drive well was driven about 8 feet into the ground at numerous points around the wells from which the supply was drawn, and tests for nitrite made on the water pumped from these. By noting which wells showed the highest nitrite, he was able to locate a large amount of decomposing animal matter. The nitrite in the waters from the several wells varied from nothing and .002 to as high as .046 and .044, the latter being found near the putrifying matter referred to.

TIMBERS PRESERVED IN SALT.

In replacing a trestle recently burned along the north shore of Great Salt Lake, according to the "Railway Age-Gazette" engineers found piles perfectly sound after 43 years of service. At another point on the lake, piles 18 in. thick, set 29 years ago, are similarly preserved with salt which has penetrated to their very centre. Timbers in trestles across Salt Lake, placed in 1902, appear to be as good as when they were driven. They have been preserved well above water line by the salt dashed on them by the waves. The first transcontinental telegraph line was abandoned when the railroad was built, and the old poles were sawed off at the ground. An engineer who recently examined the butts in the salt desert near Fish Springs found that, although fifty years had passed since the poles were cut off, the old butts were perfectly sound.

Telephone companies in the Salt Lake valley use salt for preserving poles. When set up, about a bushel of salt is placed around the pole on the ground. The reason why the waters of Salt Lake act as a strong preservative, as distinguished from ocean waters, is because the lake water contains so much more salt, being practically a saturated solution.