The cinder-filled trenches will intercept the seepage water and prevent it from reaching the roadbed, and the cross drains will remove the surface water and rainfall before it has time to soften up the subgrade, thus affording a dry and stable roadbed that will support the heaviest traffic with a minimum amount of section labor.

A large proportion of the section labor on many railroads is expended in maintaining surface and line of tracks over soft spots of varying magnitude, the elimination of which will greatly reduce the cost of maintenance. A thorough inspection, including the digging of cross trenches to firm soil under the track, should be made in each case, the origin of the water determined, and the necessary remedy applied.

The location of all cross drains should be permanently marked on the ground and the ends of longitudinal drains well protected from frost, and so located that the outlet will not require any attention to keep it free and open. A complete record of drains should also be kept in the division office.

PAINTING STEEL BRIDGES.

The Ontario Highways Department in their annual reports deal in a practical manner with the many questions that confront the highway superintendent. The painting of steel bridges is a most important matter that is too often neglected. In a recent report this matter is referred to.

The life of a steel bridge is largely dependent upon the manner in which it is first painted—and afterwards kept painted. Unless kept properly painted, they deteriorate very rapidly. Railway bridges are greatly injured by the vibration caused by heavy moving loads. But in the case of highway bridges, rust is the chief destructive agency. If they could be fully protected from rust, steel highway bridges would practically last forever. It is found that painting is required about once in five years; oftener if the bridge is in a much exposed situation by a lake shore.

Before painting steel, the surface should be absolutely free from rust, scale, moisture and grease. Rust is removed by scraping with steel scrappers, and scale by the use of stiff wire brushes. Rust left beneath the paint will spread, in time the paint will flake off, and the metal is then wholly exposed to the destroying action of air and moisture. As portions of the metal in a bridge are only ¼ and 9-10 of an inch thick, it is evident that rust, acting on both sides, can greatly weaken the structure. Connections, too, require special care, to see that they are fully protected. Bridge companies rarely exercise sufficient care, when erecting a bridge, to see that the scale is fully removed and the bridge properly painted.

The materials commonly used in painting bridges are red lead mixed with linseed oil, and oxide of iron, with linseed oil. The former is much the more desirable paint. These are subject to much adulteration, and care has to be exercised to procure reliable materials. Lamp-black added to red lead will change the color to a rich chocolate, and will not injure the paint.

A useful paint consists of red lead, lamp-black and pure raw linseed oil, mixed in the proportions of one pound of lamp-black, eight pounds of red lead and one gallon of linseed oil. The red lead and lamp-black should first be mixed dry, the linseed oil added, and the mixture stirred to a uniform consistency. Only a sufficient quantity for immediate use should be mixed at once. Thinning and drying ingredients should not be used.

Of the 141,006 tons of asphalt exported from the Pitch Lake, Trinidad, the United States took approximately 100,000 tons, the United Kingdom, 17,000; Germany, 18,000, and France, 6,000; there is none noted for Canada. In 1906-7, the export was 115,875 tons. Manjak to the amount of 1,806 tons was shipped from Trinidad, as compared with 1,548 of the previous year. The greater part went to America, and one ton to Canada.

A NEW ROAD PAVEMENT.*

Some months ago a Canadian company was formed to handle Westrumite, and on August 30th the city engineer of Brantford, accompanied by a committee, inspected Westrumite pavements in the vicinity of Chicago and reported to the Brantford council.

Goshen, a town with 11,000 population, was first visited. Here they inspected Fifth Street, laid with Westrumite. Part of street laid two weeks ago and part just being laid. At Jefferson Avenue at intersection of Fifth Street dents from horses' shoes one-half inch deep. Claimed that these will roll out. Street about 33 feet in width, given only five inches at a crown in part completed. Crown increased in newer part improved appearance. Laid on eight inches of broken limestone instead of concrete.

Upon layer of limestone is spread a wearing surface composed according to weight of two parts broken limestone to pass through a quarter-inch ring, two parts of fine limestone dust and two parts of coarse, clean, sharp sand, and eight parts of the best quality broken limestone, broken to a size that will pass through a ring of one-inch internal diameter and be held on a ring of one-half inch internal diameter, the exact proportions being such that a compact mixture is obtained containing not more than 25 per cent voids). One and one-half parts of a bonding material, consisting of asphaltic cement manufactured from natural asphalt and proper fluxes. These materials in proportions as specified above are thoroughly mixed cold by hand or machine, and spread upon said roadbed in such quantity that after being covered with clean sand to the depth of one-sixteenth of an inch it shall have a thickness of two inches in the centre and 1½ inches at the sides. This wearing surface is rolled till it is even with a steam roller weighing not less than three tons and not more than six tons; afterwards it is thoroughly compressed with a ten-ton roller.

It is stated this two inches of surfacing rolls down to 1½ inches, and after a top dressing is applied of one part Westrumite to one part water and one part screenings. Contract price for pavements, $1.65 per square yard, with stone delivered on the work at 85 cents per cubic yard; if laid on five inches of concrete, the cost would probably run to $2.10 per square yard.

At Lincoln Park, Chicago, they inspected about 500 square yards of pavement laid in park. Stated that old macadam broken up and about 1½ inches of Westrumite surfacing done on old stone. Stated that this pavement had not been repaired since laid in July, 1907.

Visited Oak Park, a suburb of Chicago. Population about 3,000, about fifteen miles out. Superior Street paved with Westrumite about two months ago. Length of street about 60 feet, width 28 feet of street, no curb or gutter. Laid on broken stone. Pavement less noisy than brick and asphalt pavements at either end.

At Indiana Harbor, a town of some 17,800 people, and soil light sand, the Westrumite pavement was laid on eight inches of broken stone. Cost, $1.98 per square yard. Curb and gutter, 70 cents per lineal foot. Sidewalks, 13 cents per square foot. About 9,600 square yards of pavement.

Visited McGoon Avenue, East Chicago, and inspected bitulithic pavement. Wearing surface composed of much larger broken stone than Brantford bitulithic. Laid on broken stone foundation. Some holes in this pavement, caused by shovelling from sewer construction having been left in trench. The pavement had been down four years, and apart from those had worn well.

Visited Whiting, Ind., where Westrumite works are established. Trinidad and California asphalt inspected; tasteless. They and Bermuda asphalt mixed with a flux to form Westrumite. Tests made to show that when first used it is soluble in water, and readily absorbed by the stone with which it is mixed, but that afterwards, owing to a chemical change, insoluble and waterproof. Poured on paper and at first would wash off, but later washing made no impression, and water poured on the paper would not stain.

*Abstract of a report by Mr. T. Harry Jones, city engineer, Brantford, Ont.