

enumerated in the foregoing in their order, we first have a cracked bituminous surface and, unless the cracks are caused by some serious form of disintegration in the pavement, they can be repaired by cleaning them out thoroughly and pouring them full of either a hot or cold bituminous material of the proper grade, and thereafter tamping or wedging stone chips into the crack, thoroughly sealing it. If the crack is wide enough and the edges have crumbled or broken off, they should be cut down evenly and the opening filled and tamped with a mixture of the bituminous cement and stone chips in a proportion of one part bituminous cement to nine parts chips, in sufficient quantity to insure complete closure.

When the entire surface is cracked or broken and is uniformly bad and gradually crumbling away due to the disintegration of the material from any of the several causes hereinbefore mentioned, it becomes necessary to remove the old material and replace with a new surface. If the condition exists only in local spots this will develop into pot holes or depressions which can be repaired by cutting out the affected areas down to the foundation and replacing with a new mixture.

The character of the bituminous material to use depends entirely upon the conditions in each case. Unless the repair work is extensive, it is not deemed advisable to use hot bituminous compounds in this work, not only from an economic standpoint but from a point of convenience as well. Small repairs in the proper season can be handled economically and efficiently with cold bituminous cement and if the proper mixture is used in the regular working season excellent results can be obtained.

It is conceded that hot bituminous repairs are not generally satisfactory when made at low temperatures, but in some places the avoidance of this practice has been carried almost to a fault. As an example, in some of the larger municipalities where defects have developed in the surface during the winter months, the affected portions have been removed and repaired with brick or stone block. This method is not only objectionable on account of the annoyance to traffic but when the regular season for repairs arrives it is usually found that additional work is required, occasioned through the inequality of the surface. It has been stated by some of the advocates of this method that it is an assurance that the affected portions will not be overlooked when the repair work is taken up in the spring. It has been demonstrated, however, that where conditions are so acute that this method is warranted, there is justification for making special arrangements for preparing and placing a suitable bituminous mixture which will be more satisfactory in the interim and, whereas, probably not a complete success, will offer as good, if not better, opportunities to correct later than the first method, which seems only to be justified when repairing cuts made in the pavements by public service corporations in the winter season.

When the surface of a bituminous concrete pavement begins to show that the bituminous material is disintegrating and the surface has a dry, porous appearance, similar to the appearance of the bituminous macadam pavement previously described, the surface can be revived by a light bituminous surface application the same as in the former case.

The wavy, irregular surface on bituminous concrete pavements is one of the most unsatisfactory conditions pertaining to the bituminous type of pavement. It is a defect that in most cases is proof positive of the inability of the pavement to meet the traffic requirements, except when the fault may have resulted from the methods used in the construction rather than the materials. If the

materials have been found unsatisfactory and the irregularity of the surface is increasing steadily, reconstruction will eventually be necessary.

If the surface is only affected in local spots due to any of the other causes enumerated, this area may be removed and replaced with a new mixture which has been properly selected and strict attention should be given to the requirements of the mixture in order that a repetition of the original deficiencies cannot obtain.

When the proper material has been used in the original construction and the surface is irregular through careless methods in spreading, beneficial results can be obtained from rolling the surface in hot weather with a tandem power roller operated by a competent man.

In the repairs to the edges of a bituminous pavement not confined by headers, the first and most essential thing to do is to correct the cause, if possible. If the drainage of the shoulders or base is faulty, this should be taken into consideration first and ample provision made therefor. On shoulders which are composed of non-porous material, it is advisable to cut scuppers or small surface ditches at intervals of approximately twenty feet along the road and, in addition to this, the material immediately along the edge of the pavement should be replaced for a depth of a few inches with broken stone or gravel tamped into place to produce a more stable buttress for the new bituminous material. The patches should be made by removing the affected area and replacing with new mixture. Successful repairs should neither be above nor below the surrounding surface when finally compacted.

In municipalities where there is enough yardage to warrant a central mixing plant, this is the most satisfactory method of handling bituminous repairs. With every facility at hand to compound the mixture properly, more uniformity is assured and much of the personal equation resulting from separate organizations is eliminated. There are localities where possibly small portable mixing plants would meet the requirements and give satisfactory results. However, under ordinary conditions, the problem is generally a small town with probably several short streets or some other unit, such as a county or state, with continuous stretches of miles of interurban bituminous pavements or highways. In either case, it means one or a number of outfits performing the repair work, which conditions give strength to the demand for simple and efficient methods. With trained men, good hot bituminous mixtures have been prepared by hand, but considering the chances taken in over-heating the material, the careless proportioning and mixing and the extra expense in connection with the handling of the equipment, etc., it does not justify this method. The cold bituminous mixture with the proper material is the most economical and fool-proof method for ordinary repairs. The material can be mixed on a regular mixing board, stock prepared for future use, if need be, and stored at convenient intervals along the road and, aside from the small tools, such as shovels, rakes and tampers, no other equipment is absolutely necessary. Repairs have been made with cold bituminous mixtures on extremely heavy-travelled roads that are in excellent condition after four seasons of wear.

---

In a recent report of the Coal Conservation Sub-Committee on the Supply of Electrical Power, proposals are made which would revolutionize the industry of Great Britain. The main reforms advocated are as follows: Construction of 16 super-power stations in different parts of the country; supervision, with adequate compensation, of 600 smaller undertakings now in existence; utilization of the by-products at each of the big stations; national control of the whole undertaking by a national board of electricity commissioners.