

We next experimented with various bituminous compounds, and in 1909 used a mixture of asphalt and sand in laying a 30-in. sewer. This gave so much better results than anything we had previously tried that we continued its use, and up to the present time have found nothing that is more satisfactory, considering the ease of manipulation, cost, etc. The method of making a joint with this material is similar to that used for lead joints, except that the material does not have to be caulked. It also required very little heat to bring the compound to the proper consistency, a small wood fire being all that is necessary. We take the precaution to fill the angle between the bell and the barrel of the adjacent pipe with cement mortar, but do not think this is absolutely necessary, especially in the smaller sizes of pipe.

We have recently inspected some of the first work done with this material and have found the joints in perfect condition, and could see no change in the consistency of the compound itself.

In the accompanying table are tabulated the results of an inquiry as to methods used in other communities.

COUNTY ROAD SUPERINTENDENTS CONFER

The fourth annual conference on road construction for county road superintendents and engineers was held under the auspices of the Ontario Department of Public Highways, February 25th to 28th.

The papers which were read provoked an unusual amount of discussion. The discussion was led this year by the superintendents and county engineers themselves instead of, as in former years, by engineers of the department.

The attendance was larger than had been anticipated and the enthusiasm of all who were present would indicate that the conference fills a want in the experience of the men who are responsible for the construction and maintenance of highways in Ontario.

The following county road superintendents and engineers were in attendance: Thos. R. Allison, Wentworth; Wm. Watters, Lanark; John M. Young, Wellington; Peter Robertson, Lincoln; Wm. Forbes, Oxford; H. G. Bleeker, Hastings; C. R. Wheelock, Peel; Chas. Talbot, C.E., Middlesex; T. V. Anderson, Lennox and Addington; H. D. Cleminson, Prince Edward; J. G. Wilson, Halton; John Roger, C.E., Perth; R. H. Fair, Frontenac; M. D. Hallman, Waterloo; Samuel McClure, Carleton; E. R. Blackwell, Leeds and Grenville; E. A. James, C.E., York; D. W. McBurney, Haldimand; W. W. Brookfield, Welland; F. A. Senecal, Prescott and Russell; J. G. Cameron, Dundas, Stormont and Gengarry; A. R. McVicar, Brant; D. J. Izzard, Bruce; G. R. Marston, Norfolk; L. A. Pardo; Kent; Frank Pineo, Elgin; Robert McQuigge, Renfrew.

HONOR ROLL FOR TORONTO BRANCH

The Toronto Branch of the Canadian Society of Civil Engineers is preparing an Honor Roll. Members are requested to send the names of men who are now serving in the Imperial or Canadian armies to George Hogarth, secretary, Parliament Buildings, Toronto, or J. R. W. Ambrose, Toronto Terminals Railway Co., 36 King Street East, Toronto.

LIGNITE COAL IN MODERN STEAM PLANTS*

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THERE has been a great deal written about lignite coal and a great many tests of this coal have been made, and a conclusion has been drawn that this coal cannot be utilized economically unless it has been put through a certain process of manufacture, such as briquetting, gas or powered fuel. More recent experiments have found that the coal can be handled in its natural state, without special preparation, and that economical results can be obtained as well from this coal as from other coals which have a greater percentage of heat value, and less ash.

In making an analysis of any coal, there are two ways in which it may be done, each of which furnishes information of considerable interest and value to the engineer. Of these analyses, one, called an ultimate analysis, determines the percentage of the various chemical elements of which the coal is composed, but does not necessarily show in what manner these elements are combined. It shows that, if a sample of the coal is separated into its elements, these will be certain proportions of oxygen, hydrogen, carbon, etc. These proportions are generally expressed in percentages of the weight of the original sample, the weight of which is considered as a unit, or 100 per cent. From the ultimate analysis, the heating value of coal may be estimated.

Although the ultimate analysis of a fuel presents difficulties that render it impracticable for any but a skilled chemist, there is a method by means of which a careful engineer can acquire an amount of skill that will enable him to determine the percentage of water, volatile matter, fixed carbon, and ash, with a fair degree of accuracy. This method is called a proximate analysis, and is described in any engineers' handbook.

Another method commonly used among old firemen is to take a few lumps of coal at random from the pile, pound them up with a hammer till very fine, then fill a clay pipe, place the pipe in a position to be able to watch the effect, care to be taken that the bowl is set firmly among pieces of red-hot coal in the fire-box or on the floor of the boiler-room on a shovel. When the powdered coal in the pipe bowl is burned to ashes, from this ash is determined the quality of the coal. The impression so gained is very hard to change. When the chemist takes samples at random he later places all of them together, subdividing them many times, each time reducing a section and subdividing it, till at last his final sample is a good average of the whole.

Analysis of a Few Coals Used in Winnipeg

	Moisture.	Vola- tile.	Fixed carbon.	Ash.	B.t.u.
Anthracite	3.46	3.86	83.77	6.6	14,000
Semi-anthracite ..	.65	9.40	83.69	5.34	15,500
Semi-bituminous .	1.0	21.0	74.39	3.03	15,700
Bituminous	1.03	36.50	59.05	2.61	15,000
Sub-bituminous ..	2.8	40.7	50.85	5.65	12,500
Manitoba lignite..	23.49	35.01	31.50	9.99	8,128

A good steam coal is the semi-bituminous of these pochontas and the standard of this part of Canada. The price of this coal is naturally the basis on which all coals

*Abstracted from paper read before the Manitoba Branch of the Canadian Society of Civil Engineers.