1.7

1.4

1.7

1.6

0.8

1.0

In Table 2 is shown the average difference between the highest and lowest weights obtained by all operators with all sizes of measures.

A comparison of this table with Table 3 on page 323 of the 1917 Proceedings shows that the rod method gives as little average difference between highest and lowest results as does Method D, and not appreciably more than the cone method. The rod method gives a small maximum difference as compared with other methods.

Taking up next the average variation from the mean, there is shown in Table 3 this average for all operators with all sizes of measures.

This table indicates, as will be shown by comparison with Table 5 of the previous reports, that the rod method gives more concordant results than any method used except the cone method, which is slightly better in this particular.

Coming now to a summary of the results obtained with all of the nine methods employed, there is shown in Table 4 data which gives a very concise idea of the relative values of these methods.

From this data it is apparent that the rod method gives medium weights per unit volume, that it gives a low

INTERRELATIONSHIP OF HIGHWAY, RAILWAY AND WATERWAY TRANSPORT*

BY PROF. HENRY E. RIGGS University of Michigan

W HILE the motor truck is a very recent invention, its place among the permanent transportation agencies is assured. There is a dearth of exact information as to cost of operation, effect of motor truck traffic upon road surfaces of different kinds, effect upon the machines themselves of different kinds of road surfaces, the tractive power of the machines on different grades and surfaces, and many other matters on which definite information must be gained through experience.

The history of civilization is very closely linked with the history of transportation. The development of water transportation has always come first with every nation. The ease with which large cargoes could be transported, the cheapness of water carriage and the absence of capital costs and maintenance charges except to terminals and equipment account for the development of navigation through

TABLE 4-EFFECT OF METHOD AND LOWEST WEIGHTS OF AVE	ON A TAINED RAGE V	VERAG BY A ARIAT	E WEI ALL OI ION FR	GHT, D PERATOR OM MEA	IFFERE S FOR N WE	NCE ALL IGHT	Betwei Resul'	EN HIG TS, ANI	HEST
Method	A	B	C	D	E	F	G	Cone	Rod
Average weight	88.4	98.8	103.2	104.3	98.0	83.9	87.2	11.64	95.8
Average maximum variation	7.0	7.0	7.9	5.3	6.5	6.3	5.8	4.1	5.4

21

1.9

2.2

maximum variation, and a very low average variation. The only method offering lower maximum and average variations is the cone method, but as stated in the previous report, the unit weights obtained by the cone method are so high as to be of litle value in practice and, therefore, not considered a desirable standard method for use in determining unit weights.

Average variation

This committee has, in view of all the data available, voted in favor of the adoption of the rod method as the standard method for the determination of the unit weight of concrete aggregate, and proposes to prepare, during the coming year, standard specifications for the manipulation of the method for presentation at the next convention.

SASKATCHEWAN ENGINEERS WILL INCORPORATE

A^T last month's meeting of the Saskatchewan branch of the Engineering Institute of Canada, which was held in Regina, L. A. Thornton presiding, the main topic was the possibility of securing legislation incorporating a provincial association of professional engineers similar to the associations that have been incorporated in British Columbia, Alberta, Manitoba, Quebec, New Brunswick and Nova Scotia. An organized effort will be made to show the people of Saskatchewan that legislation closing the engineering profession will be of more benefit to the general public than to the engineers themselves. An article describing the public benefit to be derived from such legislation will be prepared by a committee of the branch and will be published generally throughout the province shortly before the next session of the provincial parliament, which will probably be about November, and it is hoped that members will be able to complete sufficient educational work between now and next winter to ensure favorable consideration of the bill at the next session of the legislature.

Sir George Foster, acting prime minister of Canada, stated last Monday in the House of Commons that the Dominion government does not intend to construct or aid in the construction of grain elevators in Toronto or any other city in Ontarjo at present. all of the stages from canoe and catamaran, the galley of the ancients and the sailing vessel of the old Norsemen, down to the modern steamship. It must be remembered that

It must be remembered that in the United States, up to a considerable time after the Revolution, all of the principal cities were on navigable waterways.

The need of transportation facilities for the interior of the country resulted in the building of several thousand miles of canals, a development which was only checked by the invention of the locomotive. It is to be regretted that the United States did not adopt a wiser policy relative to her waterways. With her long coast line, with many navigable rivers affording lines of transportation for many thousands of miles, and with the Great Lakes, she had the opportunity to maintain a system of waterways for the handling of low-grade, bulky (and necessarily slow) freight along with a system of railways. Unfortunately, the railway influence was all exerted to check and destroy water transport with the result that the railways are now compelled to spend vast sums in building facilities for handling unprofitable freight. There is a distinct tendency once more to encourage the development of water transportation on the inland rivers in the west and south.

Transportation on land was slow in developing. The opposition to a policy of spending public money for building a system of good roads seems to have been general and to have continued from the first settlements on the Atlantic seaboard, down to within the last few years. It was, undoubtedly, this neglect of the roads, and the terrible condition of the roads over large areas of the country that hastened railroad development.

The railroad has always been dependent upon the general character of highway traffic and condition of highways for its tributory population. Ordinarily a strip of territory from four to ten miles on each side of the line, unless cut off by a river or hills, will furnish the directly tributary business. Impassable roads for long periods will check development. Good roads and favorable grades to the railroad will permit the settlement of districts at considerable distances back from the main line.

We have made serious errors in the development of transportation systems in the past. The neglect of waterways, the lack of good judgment in building many lines of railroad, and the failure to recognize the value of the highways and to improve them, constitute blunders which have resulted in retarded development of large areas, great financial losses and the building of much useless railroad.

*Excerpts from committee report presented to the National Highway Traffic Association.