ESTIMATION OF 18-KIP EQUIVALENT ON PRIMARY AND INTERSTATE ROAD SYSTEMS IN VIRGINIA

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For flexible pavement design purposes, the Virginia Department of Highways uses the AASHO method of determining the 18-kip equivalent single-axle load. The evaluation of the EAL-18 is based on on-location truck axle weight studies. These studies are expensive and time-consuming and hence are not used for pavement reevaluation and rehabilitation. For this reason, a method by which the EAL-18 could be economically and quickly estimated from the routinely available records seemed desirable. These records are the yearly traffic count on each section of the primary, Interstate, and arterial systems and the yearly record of the weights of vehicles using these systems. In this investigation, several methods were tried to determine the best one for estimating the EAL-18 from routine available records. A method involving three equations was considered the best for the following reasons: It provides a very good correlation with the AASHO method, data for estimating the EAL-18 are readily available from the yearly reports published by the Virginia Department of Highways (and those of most other states), and the method accounts for the weight and count of two-axle, six-tire single units, three-axle single units, and tandem trailer trucks separately, thus providing greater accuracy in the evaluation. It is shown that, even if the estimated EAL-18 deviates greatly from the AASHO value, the effect on the ultimate pavement design is very little. The approach could be used to develop traffic projections in cases where load meter studies are not feasible, for example, on roads with heavy traffic where vehicles can be counted but not weighed.

•IN VIRGINIA, for flexible pavement design purposes, the AASHO Interim Guide for Design of Flexible Pavements (1) is used to determine the 18-kip equivalent single-axle load (EAL-18) applications for a given roadway. The evaluation of the EAL-18 requires a truck weight study to obtain necessary axle weight distribution data, load equivalency factors, and a traffic count by vehicle classification. The required truck weight study is perhaps the most difficult task and is a major drawback in applying the AASHO method.

For pavement rehabilitation in Virginia, the truck weight study usually is not made. For the design of new flexible pavements, on-location weight studies of other roads—which are assumed to be carrying the same type of traffic—are utilized. These on-location studies usually are carried out in 1 day. Thus, the accuracy obtained in applying the AASHO method rests largely on the 1-day truck weight study and on the evaluator's judgment in choosing the appropriate weight study to reflect the axle-weight distribution for the proposed pavement design. In addition to these drawbacks, the on-location weight study is an expensive process.

The study reported here was conducted to provide less complex and less expensive methods of estimating the EAL-18 for a given flexible pavement road, methods that would eliminate the on-location truck weight study, at least for pavement rehabilitation purposes.

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STUDY PURPOSE

The purpose of this investigation was to determine a suitable method for estimating the EAL-18 for a given road (as would be obtained by the AASHO method) for the rehabilitation or design of primary and Interstate roads.

For estimating the EAL-18 in Virginia, it was proposed to use data readily available to all divisions and districts of the Virginia Department of Highways, for example, the yearly reports on average daily traffic volumes (2) and truck weight studies (3).

VARIABLES AND SCOPE

The variables considered in this investigation were as follows:

1. Vehicle count;
2. Average vehicle weight, i.e., the weight of all the vehicles divided by the number of vehicles;
3. 18-kip equivalent—either in terms of the 18-kip equivalent (EAL-18) for a given roadway or as the average 18-kip equivalent for each vehicle (EAL-18/vehicle); and
4. Vehicle classification in two types—by axle weight as given in the W-4 table of the truck weight reports (3) and by type of vehicle as given in the yearly traffic volume reports (2).

Other variables, such as the ratio of empty to loaded vehicles, legal axle and gross truck weights, and seasonal changes in traffic patterns, were assumed to have a negligible effect on the evaluation in Virginia and hence were considered constant. The major activities of the area, such as coal mining, do have an effect on the evaluation but were not considered in the mathematical analysis, though an arbitrary provision was made for heavy loads in coal mining areas. A distinction was made between rural and suburban areas, but the difference was so little that this distinction has been ignored and is not reported here.

The annual truck mileage is constantly increasing and will affect the forecast of the total vehicle count but does not affect the conversion of the present traffic into EAL-18 values.

In accordance with the practice of the Virginia Department of Highways, the load equivalency factors were taken directly from the AASHO Guide (1) for flexible pavements for structural number of 5 and a serviceability index of 2.5.

The methodology of estimation was established by adopting the following data:

1. On-location, 1-day truck weight studies on 93 projects in 21 suburban and 72 rural areas for 1963 through 1966,
2. W-3 and W-4 tables from the truck weight study reports for 1961 through 1970,
3. Average daily traffic volumes on Interstate, arterial, and primary roads for 1960 through 1970, and
4. Traffic data on 412 flexible pavement projects for 1960 through 1970.

METHODOLOGY FOR ESTIMATING EAL-18

The first step in determining the methodology was to calculate the EAL-18 for each of the 93 on-location truck weight studies by use of the AASHO Guide procedure. The EAL-18 values obtained by other methods were correlated with the EAL-18 values from the AASHO method, based on the assumption that the results obtained by the AASHO method were the true values.

In all methods, automobiles—which hardly add to the total EAL-18 value—were not considered. The W-4 table method accounts for two-axle, four-tire (2A-4T) vehicles by weight and volume. This type of vehicle was therefore considered in the W-4 table method. However, it has been determined that the EAL-18 due to 2A-4T vehicles does not add appreciably to the total EAL-18 value; on the contrary, consideration of it leads to poor correlations between the traffic count and the total EAL-18 value. The 2A-4T vehicles, therefore, were not considered in any of the methods other than the W-4.

W-4 Table Method

The first method investigated was the W-4 table method. This method does not require the determination of mean ADT values, the average number of axles per vehicle, or the distribution of vehicle weight groups in percentages as does the AASHO method, but it is similar to the AASHO method in its use of equivalency factors and weight ranges. It provides a means of determining the EAL-18 for each type of vehicle, which is not provided by the AASHO method.

The correlation between the W-4 and AASHO methods is shown in Figure 1. This figure shows that the two methods correlate extremely well, with a correlation coefficient of 0.99. It also shows that the EAL-18 determined by the AASHO method is about 1.25 times the EAL-18 value obtained from the W-4 method.

Asphalt Institute Method

The Asphalt Institute method (AI) is given by Shook and Lepp (4) and is based on the principle that trucks having two axles and six tires (2A-6T) or heavier are the prime developers of the EAL-18 and that vehicles lighter than these have a negligible effect on the final evaluation of the EAL-18. They use a model equation as follows:

$$\log (\text{EAL-18}) = a + b \log S + c \log W + d \log N \tag{1}$$

where

a, b, c, and d = constants;
S = legal single-axle load limit (18 for Virginia);
W = average heavy truck gross weight (2A-6T and heavier); and
N = number of heavy trucks (2A-6T and heavier).

Using an S-value of 18 for Virginia and the values of the constants as given by Shook and Lepp, we can reduce Eq. 1 as follows:

$$\log [\text{EAL-18(AI)}] = -6.413 + 1.334 \log W + 1.051 \log N \tag{2}$$

where [EAL-18(AI)] = EAL-18 obtained by the Asphalt Institute method. Equation 2 was applied to each of the 93 on-location studies by the following two methods. In the first method, the equation was applied separately to each of five types of vehicles: 2A-6T, three-axle single unit, three-axle trailer truck, four-axle trailer truck, and five-axle trailer truck. The EAL-18's for each of the five types were then summed to obtain the total EAL-18 for each weight study. In the second method, the average weight of the trucks (2A-6T and heavier) for each project was determined, and then the equation was applied to get the total EAL-18 directly. The values obtained from each of these methods were independently correlated with the values obtained from the AASHO method. It was found that there was very little difference between the two methods. The correlation coefficients, R, and standard errors of estimation, E_s, were almost identical ($R = 0.97$ and $E_s = 76.8$ for the first method, and $R = 0.971$ and $E_s = 77.8$ for the second). The correlation between the EAL-18's from the first method and the EAL-18's from the AASHO method is shown in Figure 2. This correlation shows that the EAL-18 determined by the AASHO method is about 1.42 times that obtained from the Asphalt Institute method by using Eq. 2.

Modified Asphalt Institute Method

New values of coefficients a, b, c, and d for the Asphalt Institute model Eq. 1 were determined by using a computerized multiple regression analysis. The dependent variable in the equation was the EAL-18 of each of the 93 on-location weight studies obtained from the AASHO method. The independent variables were W, the average weight of the combined types of vehicles (two-axle, six-tire and heavier) for each weight study, and N, the vehicle count (again, two-axle, six-tire and heavier). The resulting equation was

Figure 1. Correlation of the EAL-18 values obtained by the W-4 and AASHO methods.

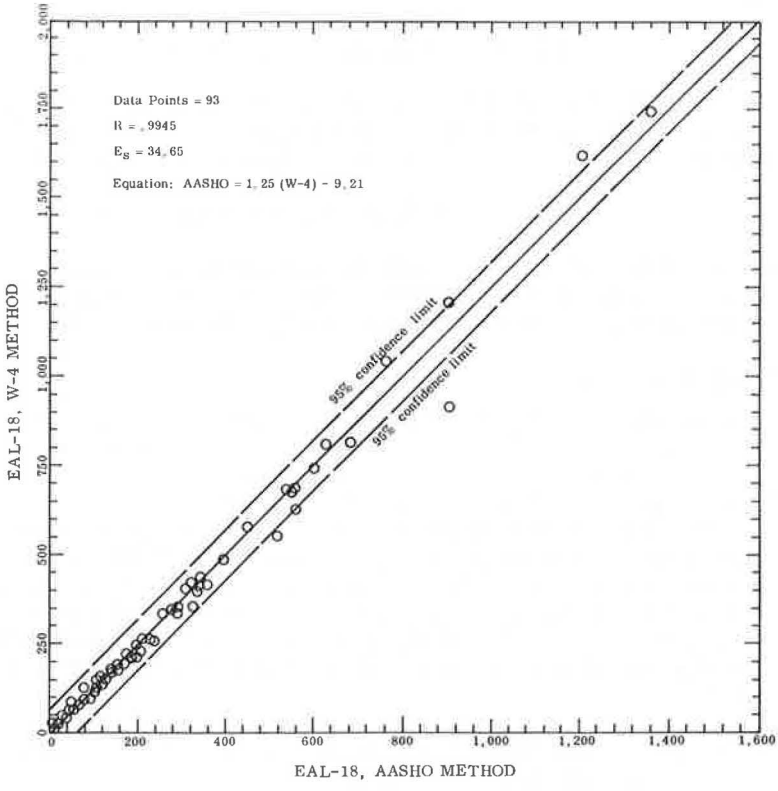
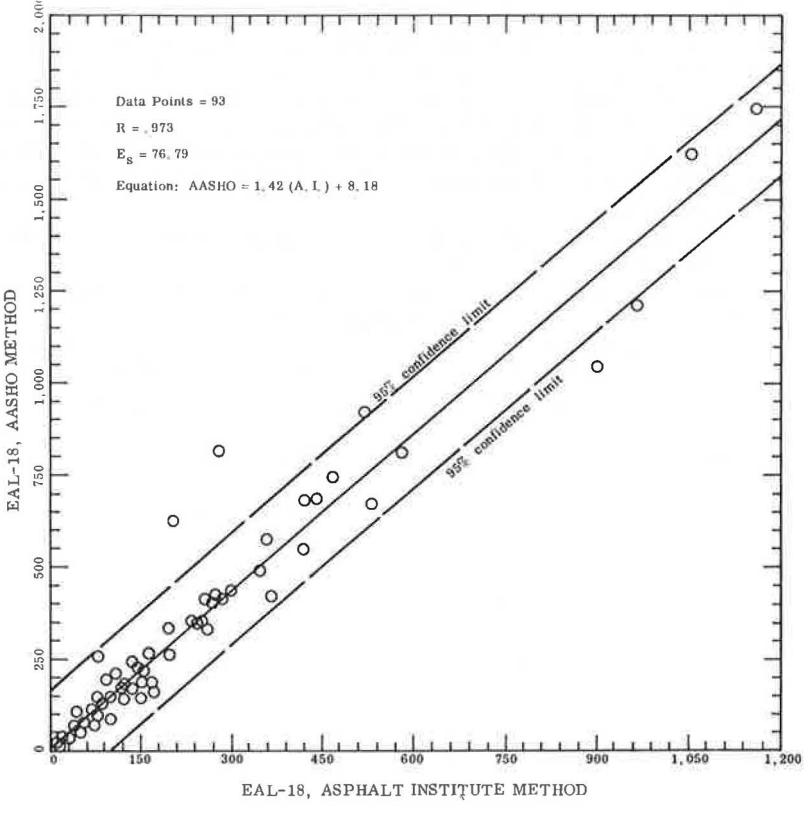


Figure 2. Correlation of the EAL-18 values obtained by the Asphalt Institute and AASHO methods.



$$\log [\text{EAL-18(mod. AI)}] = -8.483 + 1.873 \log W + 0.99 \log N \quad (3)$$

where [EAL-18(mod. AI)] = EAL-18 obtained by modified AI method. The correlation between the EAL-18 obtained by the modified AI method and the AASHO method is shown in Figure 3 and is expressed by the following equation.

$$[\text{EAL-18(AASHO)}] = 0.894\ [\text{EAL-18(mod. AI)}] + 24.79 \quad (4)$$

where [EAL-18(AASHO)] = EAL-18 obtained by the AASHO method.

Equation 4, or Figure 3, has a correlation coefficient of 0.98, which shows that the modified AI method correlates extremely well with the AASHO method.

Percent Method

In developing the percent method, a percentage distribution of the number of vehicles for different weight groups in each of the five vehicle classifications was made for the 93 on-location studies. The Appendix shows this distribution and gives values of EAL-18 per vehicle for each vehicle classification.

The values of EAL-18 per vehicle for each vehicle classification were applied to each of the 93 on-location studies, and the EAL-18 for each of the 93 on-location studies was determined. The EAL-18 values so obtained were correlated with the EAL-18 values obtained from the AASHO method. This correlation is shown in Figure 4. The correlation coefficient is 0.94, which shows that this method correlates extremely well with the AASHO results, though it has a high standard error of estimate; i.e., E_s = 116.72.

If one assumes that the EAL-18 per vehicle as determined by this method holds for all projects, the total EAL-18 for any project could be obtained if the vehicle count by each vehicle classification is known.

Five-Equation Method

In an attempt to remove weight as a variable, each of the 93 on-location studies was divided into five vehicle classifications as follows: two-axle, six-tire single unit; three-axle single unit; three-axle trailer truck; four-axle trailer truck; and five-axle trailer truck. For each classification under each study, the numbers and average weights of the vehicles and EAL-18's were determined. The EAL-18's were determined by the W-4 table method. This method was adopted because of its high correlation with the AASHO method and because the AASHO method cannot give an EAL-18 for each vehicle classification.

By multiple regression analysis, a general equation for each vehicle classification was developed. The equations for the respective classifications are shown as Eqs. 5 through 9. Each of these equations has two independent variables, i.e., W, the average weight of vehicle, and N, the vehicle count.

The data for determining W in each of the five equations could be obtained either from the 93 on-location studies or from the W-3 tables. In this evaluation, W-3 tables were used (as discussed later) and Eqs. 5a, 6a, 7a, 8a, and 9a were obtained:

For two-axle, six-tire, single-unit vehicles,

$$\log (\text{EAL-18})_1 = -21.34 + 4.991 \log W_1 + 0.99 \log N_1 \quad (5)$$

$$= -0.70 + 0.99 \log N_1 \quad (5a)$$

For three-axle, single-unit vehicles,

$$\log (\text{EAL-18})_2 = -0.74 + 0.043 \log W_2 + 1.00 \log N_2 \quad (6)$$

$$= -0.55 + 1.00 \log N_2 \quad (6a)$$

For three-axle trailer trucks,

Figure 3. Correlation of EAL-18 values obtained by the modified Asphalt Institute and AASHO methods.

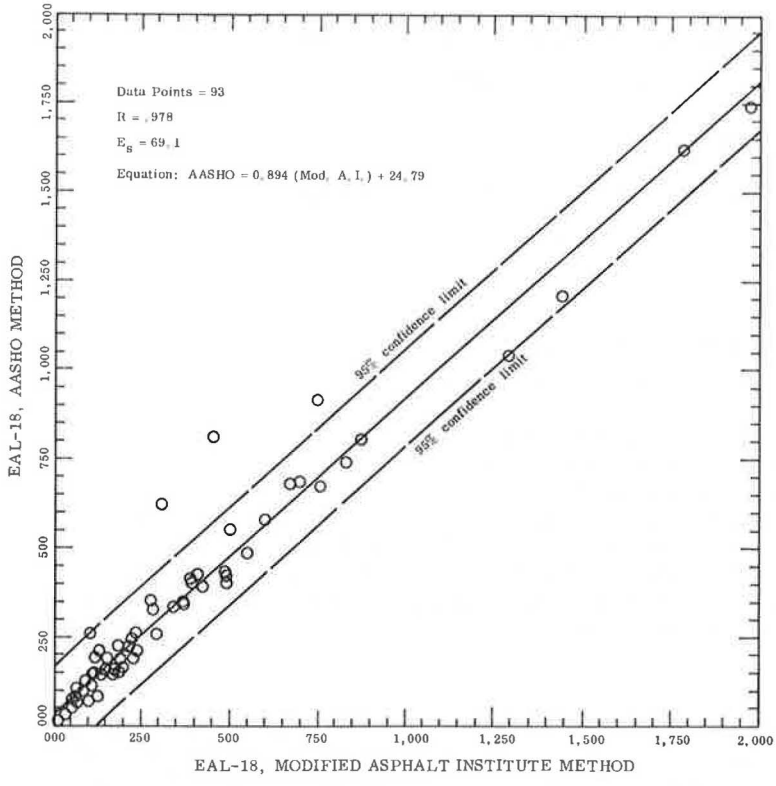
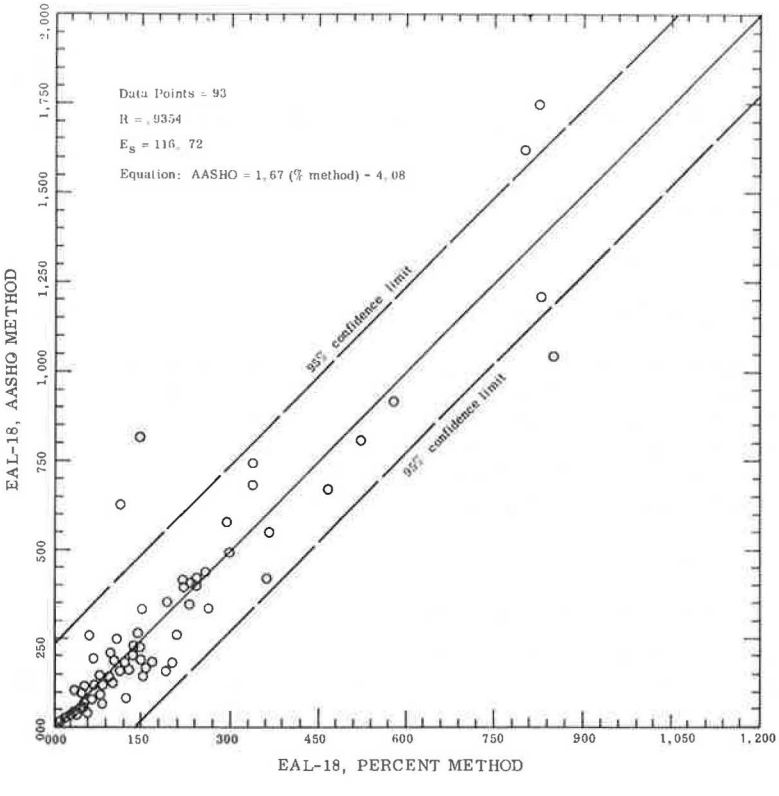


Figure 4. Correlation of EAL-18 values obtained by the percent and AASHO methods.



$$\log (\text{EAL-18})_3 = -0.04 - 0.101 \log W_3 + 1.05 \log N_3 \quad (7)$$

$$= -0.49 + 1.05 \log N_3 \quad (7a)$$

For four-axle trailer trucks,

$$\log (\text{EAL-18})_4 = -0.08 - 0.078 \log W_4 + 1.11 \log N_4 \quad (8)$$

$$= -0.44 + 1.11 \log N_4 \quad (8a)$$

For five-axle trailer trucks,

$$\log (\text{EAL-18})_5 = -0.02 - 0.035 \log W_5 + 0.97 \log N_5 \quad (9)$$

$$= -0.18 + 0.97 \log N_5 \quad (9a)$$

In Eqs. 5 through 9a, subscripts 1 through 5 for the EAL-18, W, and N show the five vehicle classifications for the EAL-18, the average weight of vehicles, and number of vehicles in each classification respectively.

The sum of EAL-18_1 through EAL-18_5 would give the total value of EAL-18 by the five-equation method. This value could be represented by [EAL-18(5-eq.)].

The correlation between this five-equation method and the AASHO method is shown in Figure 5. The correlation coefficient is 0.94, which shows that this method correlates extremely well with the AASHO method.

Three-Equation Method

The three-equation method is a simple reduction of the five-equation method. Instead of using an equation for each of the axle groups in the three classifications of tractor semitrailers, an equation was developed to cover all tractor semitrailers (three-, four-, and five-axle trucks). The equations for the single-unit vehicles (two-axle six-tire, and three-axle) remain the same as Eqs. 5a and 6a as follows:

$$\log (\text{EAL-18})_1 = -0.70 + 0.99 \log N_1 \quad (5a)$$

and

$$\log (\text{EAL-18})_2 = -0.55 + 1.00 \log N_2 \quad (6a)$$

The equation developed for trailer trucks having three, four, and five axles is as follows:

$$\log (\text{EAL-18})_T = -13.92 + 3.00 \log W_T + \log N_T \quad (10)$$

Based on the W_T values given in Table 1,

$$\log (\text{EAL-18})_T = \log N_T - 0.0578 \quad (10a)$$

where W_T and N_T are the average weight and the number of trailer trucks respectively.

The sum of $(\text{EAL-18})_1$, $(\text{EAL-18})_2$, and $(\text{EAL-18})_T$ would give the value of EAL-18 by the three-equation method. This value could be represented by [EAL-18(3-eq.)].

The correlation between this three-equation method and the AASHO method is shown in Figure 6. The correlation coefficient of 0.98 shows that this method correlates extremely well with the AASHO method. The correlating equation is as follows:

$$[\text{EAL-18(AASHO)}] = 16 + 1.22\ [\text{EAL-18(3-eq.)}] \quad (11)$$

SELECTION OF THE METHOD FOR USE

The investigation showed that, given the necessary information, the following methods enable good estimations of the AASHO EAL-18 for a given project. The correlation

Figure 5. Correlation of EAL-18 values obtained by the five-equation and AASHO methods.

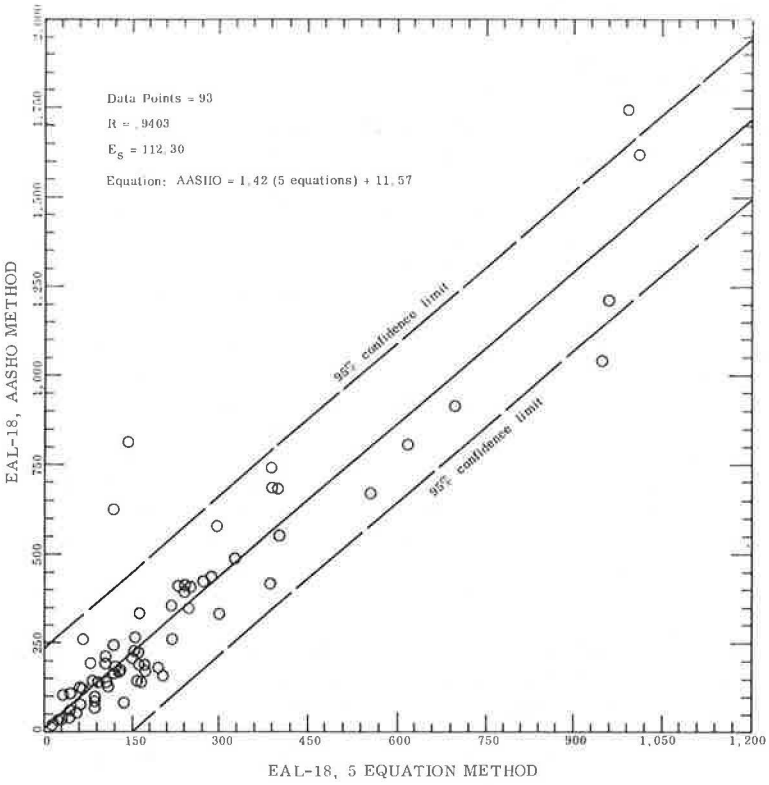


Table 1. Average vehicle weight by classification.

Vehicle Classification	Average Vehicle Weight (lb)
Single unit (two axles, six tires)	13,705
Single unit (three axles)	25,980
Tractor semitrailers (three, four, and five axles)	41,760

coefficient, R, and standard error of estimate, E_s, are also given for each method:

1. Percent method—R = 0.94, E_s = 117;
2. W-4 table method—R = 0.99, E_s = 35;
3. Five-equation method—R = 0.94, E_s = 112;
4. Modified Asphalt Institute method—R = 0.98, E_s = 69; and
5. Three-equation method—R = 0.98, E_s = 63.

The percent method requires the percentage of vehicle count in different vehicle weight groups for each vehicle classification to determine the EAL-18 for each vehicle classification as shown in the Appendix. If at a later date the weights of vehicles in each vehicle classification change, there will be no way to modify the values of EAL-18 per vehicle unless a study similar to the 93 on-location study is made. This method is therefore considered less useful than the other methods where the average weight of a vehicle instead of the EAL-18 per vehicle is an independent variable. This method is, therefore, not recommended for use on a long-term basis.

In the W-4 table method, axle counts by each weight classification need to be known. This information is not obtainable for any project without the collection of data on the site. This method, therefore, cannot be used for estimation purposes.

In the remaining three methods, the independent variables are the average weight of all vehicles (two-axle, six-tire or heavier), or the average weight of all vehicles in each vehicle classification, and the vehicle count. The average weights for all vehicles and the average weights by vehicle classification can be obtained from the W-3 tables in Virginia's truck weight study reports. The vehicle count for any Interstate or primary highway is obtainable from Virginia's annual daily traffic volume reports.

In the traffic volume reports, the trailer trucks are not categorized as three-, four-, and five-axle, which information is needed for the five-equation method. The five-equation method might, therefore, be difficult to apply in many cases. Consequently, this method is not recommended for general purposes of estimation.

The annual truck weight study reports of the Virginia Department of Highways show that, from 1963 to 1970, there was no tendency toward an overall increase or decrease in truck weights. Thus, the average truck weights during this period as obtained from the W-3(03) and W-3(04) tables are given in Table 1 and could be used for estimating the EAL-18 for any project.

The average weights given in Table 1 could be applied directly in the three-equation method. For the modified Asphalt Institute method, the average weight of the vehicle, W, is obtained as follows:

$$W = \frac{N_1W_1 + N_2W_2 + N_3W_3}{N_1 + N_2 + N_3} \tag{12}$$

where N_1, N_2, and N_3 are the counts, and W_1, W_2, and W_3 are the weights of 2A-6T vehicles, three-axle single units, and trailer trucks respectively.

In the three-equation method, Eqs. 5a, 6a, and 10a are obtained from Eqs. 5, 6, and 10 by the use of the truck weights given in Table 1. The average weights given in Table 1 could be used for design throughout Virginia, except in the coal mining areas of the Bristol district. In the coal areas, permits for higher than conventional wheel and truck loads are issued free of charge. The permits limit the weight on single and tandem axles to 24,000 and 36,000 lb as compared to the conventional maximum permissible weights of 20,000 and 32,000 lb on single and tandem axles respectively.

The values given in Table 1 could be used for design, with the stipulation that they could be exceeded by 20 percent in the coal areas. If the weight values are changed, Eqs. 5, 6, and 10 should be used for the three-equation method.

The correlations between the three-equation and modified AI methods in Figures 3 and 6 show that, though their correlation coefficients with the AASHO method are the same, the standard error of estimate in the three-equation method is slightly lower than that in the modified AI method.

To further evaluate the choice between these two methods, we selected 412 satellite projects designed between 1960 and 1970. Their traffic counts were obtained from the

Virginia reports of average daily traffic volumes. In these traffic volume data, buses are given separately. The buses are classed as either school buses of the 2A-6T type or commercial buses with three axles. Because these data are collected on working days only and between 8 a.m. and 5 p.m., almost all the school buses are counted, whereas not all the commercial buses are counted. Thus, 70 percent of the buses counted were assumed to be of the 2A-6T class, and the remaining 30 percent were assumed to be three-axle vehicles. It is, however, recommended that for general application 80 percent of the buses counted should be considered to be of the 2A-6T class and the remaining 20 percent in the three-axle vehicle class. This breakdown is necessary for the three-equation method but is not needed for the modified AI method.

For determining the [EAL-18(3-eq.)] for each project, Eqs 5a, 6a, and 10a were used. For determining the [EAL-18(mod. AI)] for each project, Eq. 3 was used. The EAL-18 values so obtained by these two methods were correlated with each other. The correlation coefficient was 0.995 with a standard error of estimate of 15.8. This is an excellent correlation. The relation between the EAL-18 values obtained by the two methods was found to be

$$[\text{EAL-18(mod. AI)}] = 13 + 1.2\ [\text{EAL-18(3-eq.)}] \tag{13}$$

The total truck traffic consisting of 2A-6T and heavier vehicles was correlated with the EAL-18 obtained by each of these two methods by the use of their equations.

In the three-equation method, the correlation coefficient was 0.92 with a standard error of 80. The correlation equation was as follows:

$$[\text{EAL-18(3-eq.)}] = -7 + 0.7\ (N_1 + N_2 + N_T) \tag{14}$$

This correlation is shown in Figure 7. In the modified AI method, the correlation coefficient was 0.88 with a standard error of 96.

The two correlations show that the three-equation method is statistically slightly better than the modified AI method, but both methods would give very good estimated values. The authors, however, feel that by use of different equations for different vehicle types, as in the three-equation method, one can obtain better estimates of the EAL-18 than from one equation for trucks as in the modified AI method.

The three-equation method is therefore recommended as the best choice for estimating the [EAL-18(AASHO)]. For ease of application of this method, the three equations have been translated into a graphical form as shown in Figure 8. The sum of three values obtained on the y-axis of this figure for the three traffic categories gives the total 18-kip equivalent obtained from the three categories. This value, when used with Eq. 11, would give the estimated AASHO 18-kip equivalent.

This three-equation method is under further review by the Virginia Department of Highways for use on new projects. Fourteen new projects so evaluated have given a correlation coefficient of 0.97 and a standard error of estimate of 66.

QUICK METHOD FOR CONVERTING VEHICLE COUNT TO EAL-18

For the easy conversion of the traffic count to the [EAL-18 (AASHO)], Eqs. 14 and 11 and [EAL-18(3-eq.)] could be combined. Based on these two equations

$$[\text{EAL-18(AASHO)}] = 16 + 1.22\ [-7 + 0.7\ (N_1 + N_2 + N_T)]$$

$$= 7.46 + 0.85\ (N_1 + N_2 + N_T) \tag{15}$$

$$= 7.46 + 0.85 \tag{16}$$

This shows that the EAL-18 obtained by the AASHO method is about 0.85 times the total 2A-6T and heavier truck traffic.

Figure 6. Correlation of EAL-18 values obtained by the three-equation and AASHO methods.

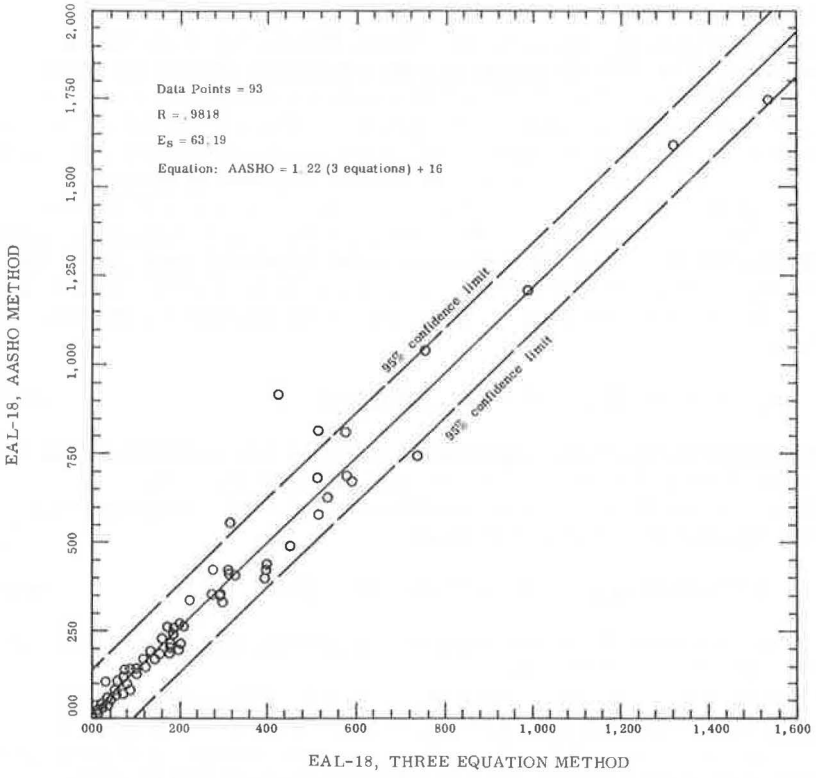


Figure 7. Correlation of EAL-18 obtained by the three-equation method and the total truck traffic (2A-6T and heavier).

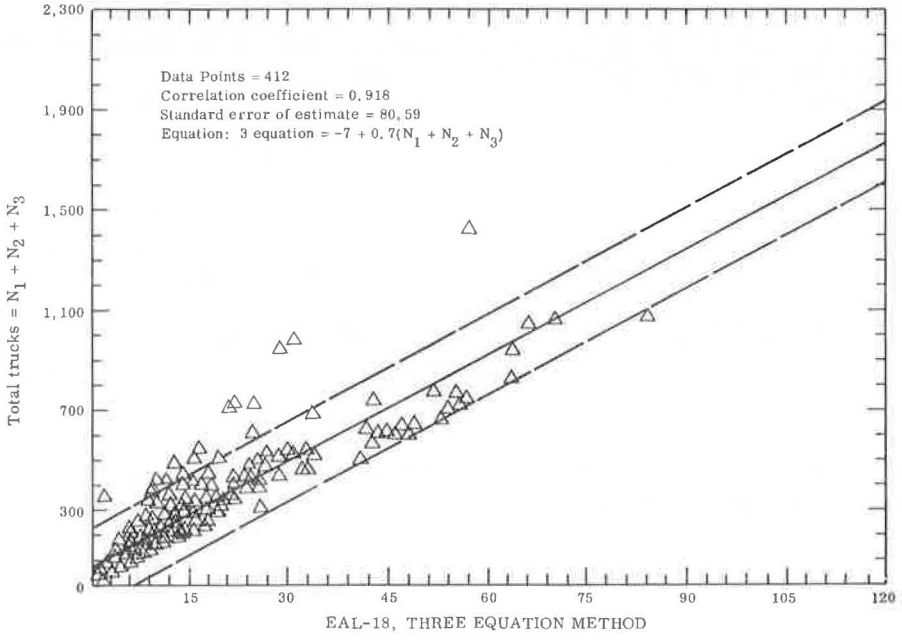


Figure 8. Evaluation of EAL-18 by three-equation method.

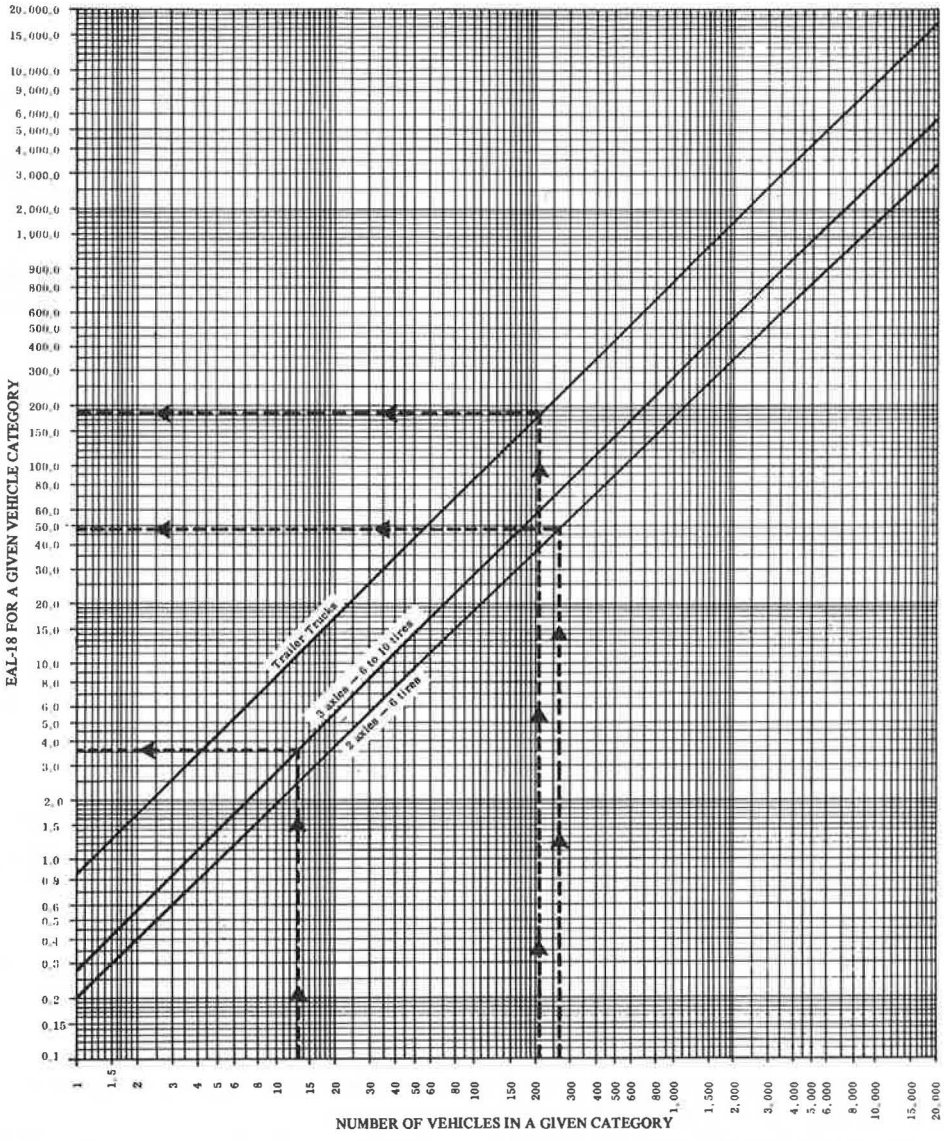
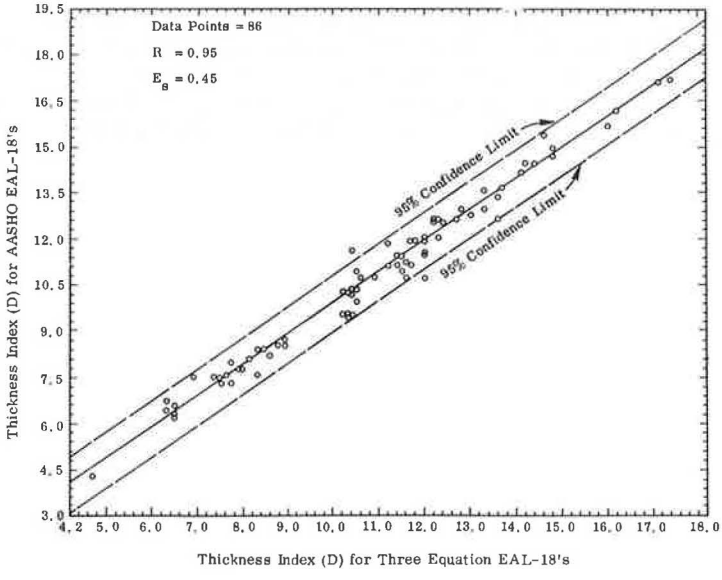


Figure 9. Correlation of thickness index (D) by three-equation and AASHO methods.



EFFECT OF ESTIMATING THE EAL-18 ON PAVEMENT DESIGN

As mentioned before, in Virginia the AASHO method is used for pavement design only. Though it was found that the estimated EAL-18 values have an excellent correlation with the AASHO values on a statistical basis, it was necessary to confirm the maximum possible deviation a designer is likely to encounter in using the estimated method as compared to the AASHO method currently used.

In Virginia for the design of primary, Interstate, and arterial roads, the pavement design method developed by Vaswani (5) is used. In this method, the thickness index (or structural number) of the pavement is determined.

The estimated values of EAL-18 obtained from the three-equation method were used to determine the thickness index (or structural number) for each of 86 projects chosen from the 93 projects considered in this investigation. The soil support values for all pavements were assumed to be 10 in the design chart of Vaswani's method. Given the soil support and EAL-18, the thickness indexes obtained were correlated with the thickness indexes obtained by using the AASHO EAL-18 method. The correlation graph is shown in Figure 9. The correlation coefficient of 0.97 and standard error of estimate of 0.45 show that the estimated value enables pavement design from estimated EAL-18 values.

CONCLUSION AND RECOMMENDATION

It is concluded that the small errors resulting from calculating or estimating EAL-18 values do not significantly affect the ultimate pavement design. It is recommended that the three-equation method be used for estimating the EAL-18 when load meter studies are not feasible.

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The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.

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APPENDIX

EVALUATION OF EAL-18 PER VEHICLE BY WEIGHT GROUP IN EACH VEHICLE CLASSIFICATION

Vehicle classification	Single Unit				Tractor Semi-Trailer					
No. of vehicles	2A-6T		3-axle		3-axles		4-axles		5-axles	
	19,355		4,472		3,841		11,509		2,519	
Percent No. of vehicles	46.5%		10.8%		9.2%		27.5%		6%	
Vehicle Weight Group in kips	% count	EAL-18/veh.	% count	EAL-18/veh.	% count	EAL-18/veh	% count	EAL-18/veh.	% count	EAL-18/veh.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
11 - 12	17	.1273								
12 - 13	47	.1432	3.5	.118	2.5	.1201	—	—	—	—
13 - 14	19	.1555								
14 - 15	7	.1687								
15 - 16	10	.1867	—	—	—	—	—	—	—	—
15 - 20	—	—	10	.2036	7.5	.2199				
20 - 25	—	—	26	.2884	26	.2880	8	.2641	—	—
25 - 30	—	—	32.5	.3736	36	.3609	9	.3853	—	—
30 - 35	—	—	13	.4547	23.5	.4596	18.5	.4614		
35 - 40	—	—	12	.5483	4.5	.5455	29.5	.5900	18	.5149
40 - 45	—	—	3	.7637			23	.6984		
45 - 50	—	—	—	—	—	—	9	.7867	33	.7218
50 - 55	—	—	—	—	—	—			18	.8718
55 - 60	—	—	—	—	—	—	3	.8443	10.5	.9608
60 - 65	—	—	—	—	—	—	—	—	13.5	.9715
65 - 75	—	—	—	—	—	—	—	—	7	1.1604
TOTALS	100	.149	100	.369	100	.357	100	.572	100	.801

% count = Percent number of vehicles in each vehicle classification in the 93 on-location studies

EAL-18/vehicle = Average 18-kip equivalent of a vehicle