The Load Transmission Test for Flexible Paving and Base Courses

Part VI
Summary of Tests With Single-Tire Loading

by

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SUMMARY

The load transmission apparatus provides a means of conducting load tests on full-scale pavement sections under laboratory conditions. A segmented loading platform supported by coil springs is substituted for the natural subgrade in order to insure constant test conditions over long periods of time, and to permit quick and accurate measurement of vertical stresses transmitted through the pavement. For a given applied load, the maximum stress on the subgrade provides a convenient means of comparing the efficiencies of various pavement sections or evaluating the effects of various design variables.

The relationship of subgrade stress to applied load should vary with pavement thickness, with contact area, and with the respective strengths, or stiffnesses, of the pavement and subgrade. An analysis of 804 loading tests on 123 pavement sections verifies the essential correctness of theoretical studies and provides numerical values for use in design or for further study. These values are given in chart form, and represent a generalization of all pertinent test data. They may be used directly in a method of pavement thickness design based on a limiting subgrade stress or deflection, or they may be used to extend empirical design into areas not adequately covered by service experience.

The triaxial test is used to compare strengths of the various materials, gravel, clay-gravel, sand, limestone, slag, and asphaltic concrete, used in the pavement sections. Although further correlation studies are in progress, the method outlined in this and previous reports is considered adequate for design purposes. The validity of the test data for use in highway pavement design will be checked by correlation with results of traffic tests on the American Association of State Highway Officials Test Road.

INTRODUCTION

The load transmission testing project consists fundamentally of a series of static loading tests on full-scale flexible pavement sections. The pavements are supported by a mechanical subgrade in lieu of the natural earth. This provides a constant and uniform degree of support, and facilitates measurement of vertical stresses and deflections transmitted to the subgrade.

Such an arrangement permits orderly long-term studies of pavement behavior under load, with each major variable controlled independently in a planned schedule of operations. The basic testing program has been under way for approximately seven years. During this period the relationship of load to subgrade deflection has been measured for almost 1,800 load applications on approximately 250 pavement test sections.

Several progress reports have been published. These are listed in the references at the end of this report. The present report summarizes and discusses the results from all of the single-wheel loadings on various pavement sections supported by either a weak, medium, or strong subgrade. Major variables ranged within the following limits:

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*Manuscript submitted for publication April 1958. The material in this report, exclusive of the Appendix, was presented by the author on January 8, 1958, at the Annual Meeting of the Highway Research Board in Washington, D. C.

Fig. 1 General View - Load Transmission Apparatus

1. Applied load - - - - - - - - - - - - - - - 2.5 to 60 kips
2. Pavement thickness - - - - - - - - - - - 3 to 24 inches
3. Tire inflation pressure - - - - - - - - - 40 to 200 psi
4. Pavement strength index - - - - - - - 22 to 246 per cent
5. Subgrade modulus - - - - - - - - - - - - 82, 150, and 300 lb./cu. in.

Some of the detailed test data used in this analysis already have been recorded in CAA Technical Development Reports.[4, 8] The remainder are given in the appendix to this report.

APPARATUS, MATERIALS, AND PROCEDURE

Figure 1 is a general interior view of the apparatus with the paving cut away to show the segmented mechanical subgrade and its protective rubber sheet. The subgrade is about 10 feet square, with 3,600 segments supported individually by calibrated springs. The subgrade pressure pattern is determined by reading spring deflections before and after loading the pavement. Each pavement section is subjected to a series of loads, increasing in magnitude, with the subgrade deflections measured after each load increment.

The tire inflation pressure is set at the desired value while the tire is entirely free of load, and is allowed to increase normally during the loading cycle. The actual inflation pressure at the heavier loads may be as much as 10 psi above the nominal pressure.

A number of different airplane tires were used in the earlier tests. Although the size and geometric proportions of the tire appear to have some effect on the load-reaction curve, the effect is a minor one, at least for the range of tires used, and was not considered in the analysis.

Granular paving materials are blended and mixed in a pug mill mixer, placed in lifts of about four inches compacted thickness, and compacted by vibratory methods. Densities are comparable to those obtained in the field by rolling. A single material usually is used for the entire pavement depth, but some composite sections have been constructed.

The asphaltic hot-mix used to date has been obtained from commercial plants supplying material for highway and street work. Vibratory compaction of the asphaltic concrete has been supplemented by hand and pneumatic tamping.

Granular materials have included gravel, clay-gravel, sand, crushed limestone, and crushed slag. The materials were selected to provide wide ranges of grading, roughness, particle shape, and plasticity. They are not necessarily representative of the best or the average of the general types of material used. Typical samples are shown in Fig. 2.

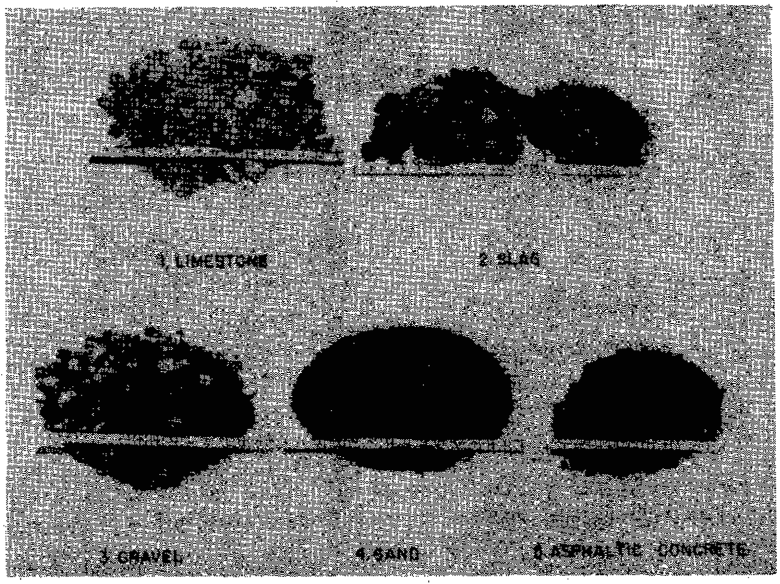

Fig. 2 Typical Materials

A portion of the paving mixture is set aside for construction of at least three triaxial specimens. These are designed to be of the same density, moisture content, and state of curing as the corresponding pavement section. When unplanned variations in these variables occur, the triaxial results are adjusted accordingly on the basis of judgment and experience.

There is some evidence that the lateral pressure for the triaxial test should vary, depending on the degree of confinement which the material will have in the pavement layer where used. The relationship and procedure now in use are defined later in this report.

Inasmuch as the load transmission test itself is a static test, it follows that the triaxial tests should be run at a loading rate low enough to eliminate any dynamic effect on the indicated strength of material. This would involve loading at a strain rate of about 0.01 per cent per minute, and would require several hours to run one test. In order to achieve a reasonable production rate, the granular materials and mixtures, all of which are affected to a similar degree by rate of loading, have been tested at a strain rate of 0.5 per cent. The asphaltic concrete specimens, much more sensitive to this effect, were loaded at a strain rate of 0.02 per cent, which gave comparative results. The triaxial test results are not absolute strength values, therefore, but are used only for comparison of each material with the standard.

DISCUSSION OF TEST DATA

The pressure pattern on the subgrade may be expressed conveniently in the form of pressure "contours." When loading with single tires, however, with the maximum value always occurring under the center of load, the pressure distribution may be shown more simply by use of cross-sectional views on the principal axes of the pattern. This has been done in Fig. 3.

Although the entire distribution pattern is required for some purposes, such as studies of multiple loading, it often is possible to use the maximum value of the subgrade reaction as a convenient measure of comparative pavement performance. For example, pavement A of Fig. 3 has done a better job than pavement B in distributing load over the subgrade and this fact may be expressed by a numerical comparison of maximum subgrade reactions. This is the criterion used to measure pavement effectiveness in this report.

Figure 4 presents typical load-reaction curves plotted from actual test data. When plotted on log-log scales the bottom portions of the curves are nearly straight. The spacing and slope of the curves vary widely with pavement thickness. As the loads are increased the curves tend to flatten, reflecting the effect of increased contact area. If contact pressures on

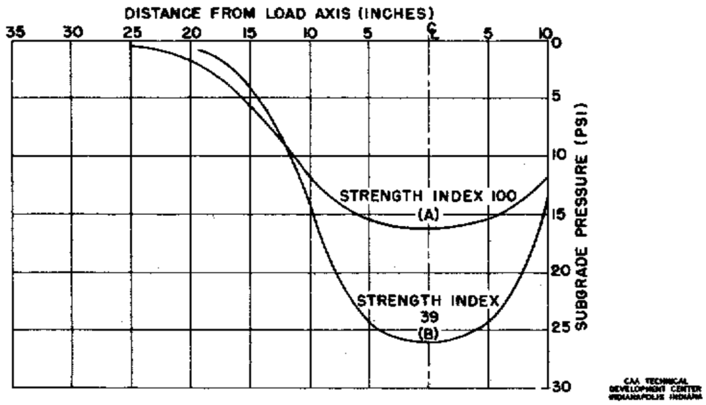

Fig. 3 Cross-Sectional Views of Pressure Distribution

the pavement surface were uniform, and were equal to the initial tire inflation pressure, the maximum subgrade reaction would tend to approach this value as a limit when the applied load and corresponding contact area became infinitely large.

The paper presented by Lawton[9] at the 1957 meeting of the Highway Research Board showed that the contact pressure under a tire is far from uniform and may reach a maximum considerably above the nominal inflation pressure, even under moderate loads. The dotted portions of the curves in Fig. 4 indicate that extrapolation of the curves to a value of twice nominal inflation pressure would not be unreasonable.

After compilation and analysis of all available data, it was possible to construct the generalized curves of Fig. 5 which, by simple interpolation, will give the relationship of maximum subgrade reaction to applied load for any combination of pavement thickness and inflation pressure within the limits indicated. These curves apply directly to only the standard gravel base course material and weak subgrade (k=82). They are similar to those presented in CAA Technical Development Report No. 282,[8] but have been revised slightly for better over-all agreement with all the test data now available.

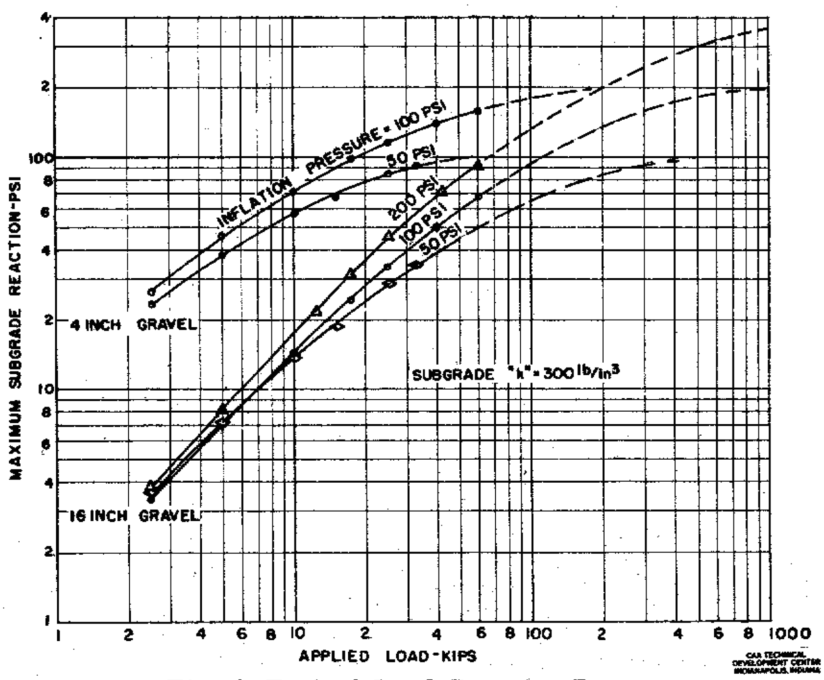

Fig. 4 Typical Load-Reaction Data

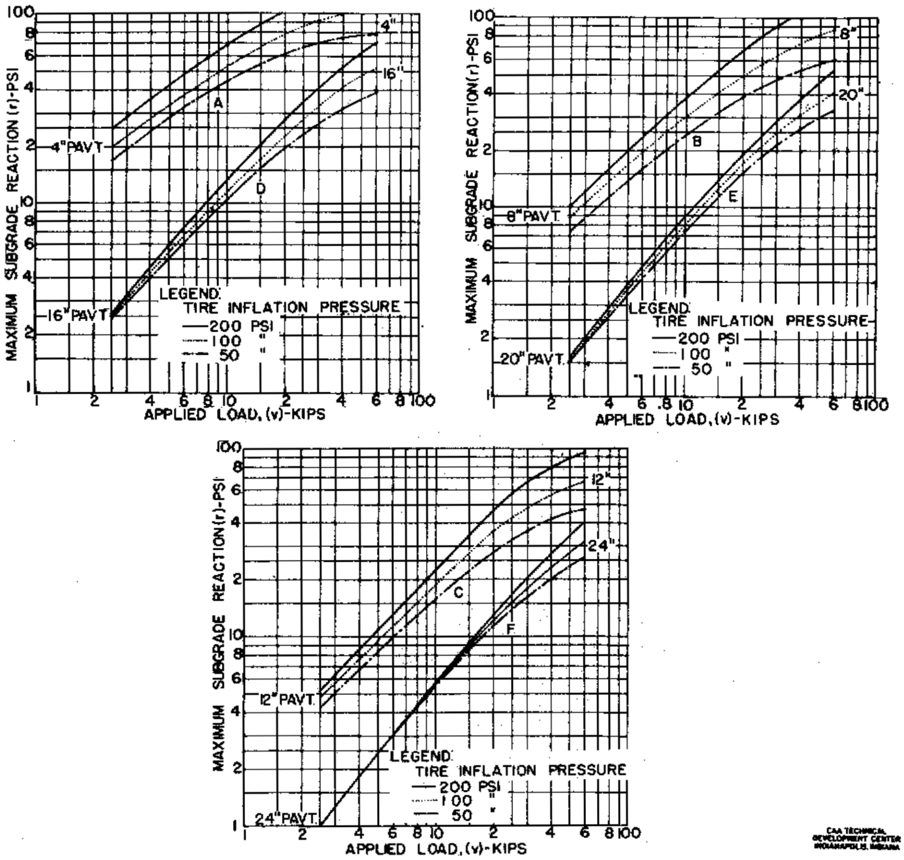

Fig. 5 Generalized Curves for Standard Gravel and Weak Subgrade

In order to generalize the curves for all conditions, it is necessary to provide corrections for the effects of subgrade stiffness and the strength, or stiffness, of the paving material. Changes in either of these variables tend to move the loading curves parallel to themselves as shown in Figs. 6 and 7. On a log-log graph this means that ordinates from one curve are related to those of another curve by a constant ratio. Values of maximum subgrade reaction taken from Fig. 5 can be corrected for other subgrade and pavement strengths by simply applying correction coefficients taken from Fig. 8.

Subgrade stiffness is indicated by use of the familiar modulus of subgrade reaction (k) used in Westergaard's theoretical analysis of rigid pavements. Use of this "heavy liquid" concept of subgrade support is particularly appropriate to the mechanical subgrade used in the load transmission tests.

The strength of the pavement section is expressed as a "strength index." This is the percentage of the strength of the gravel base course material used as a standard in preparing the curves in Fig. 5. The strength index of a pavement section may be determined from triaxial tests in the following manner:

1. If necessary, divide the proposed pavement section into layers, each not more than eight inches thick, and each composed of only one type and quality of material.
2. Perform triaxial tests on specimens representing each layer of material, using a lateral pressure which is determined by the average depth of the layer in the pavement section. See Fig. 9 for the lateral pressure to be used.
3. Divide the vertical pressure at failure, determined in Step 2, by the corresponding value for the standard gravel at the same lateral pressure. Values for the standard gravel are given in Fig. 10, which also shows average curves for some of the other materials which have been tested.
4. If the pavement consists of more than one layer, take a weighted average of the ratios obtained for the various layers in Step 3. This is the STRENGTH INDEX for the entire pavement section.

It may appear that a modulus of deformation representing stiffness rather than ultimate strength should be a better criterion for comparing paving materials. This has not proved true in the analysis thus far, but is being studied further.

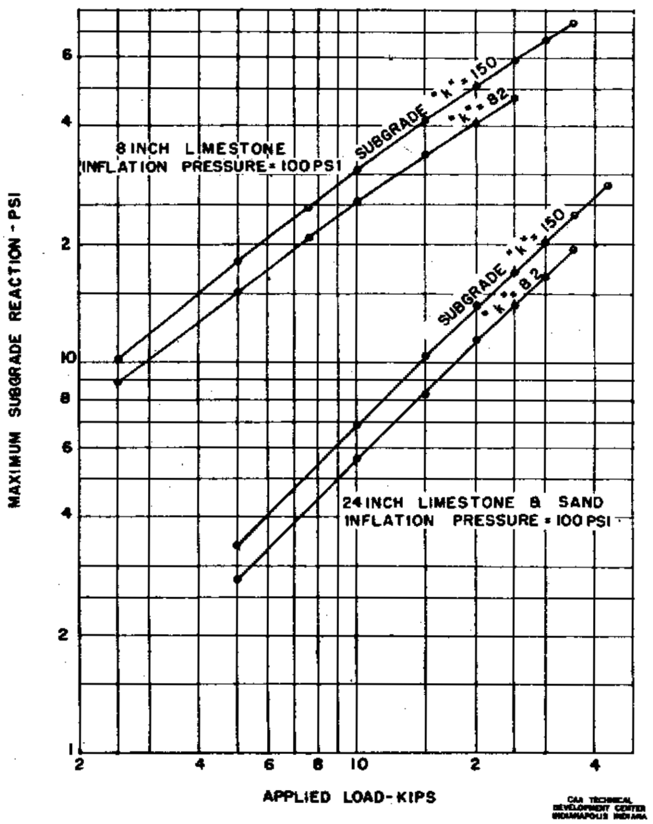

Fig. 6 Effect of Subgrade Modulus

Values of subgrade reaction computed from triaxial test data by use of Figs. 5 and 8 have been compared with the corresponding values actually measured in the load transmission tests. Deviations of measured values from computed values were plotted on probability paper and are shown in Fig. 11. The plotted points approach a curve of normal distribution, indicated by a straight line on the graph. The standard deviation is 11 per cent.

Of the 804 readings involved in the comparison, 93 per cent fall within 20 per cent of the computed values. Deviations greater than 20 per cent occurred mostly in small readings where differences of one pound per square inch or less appear large when expressed percentagewise. Any closer correlation between computed and measured values apparently can be achieved only by use of a more complicated process, and does not appear justified from a practical point of view.

APPLICATION TO DESIGN PROBLEMS

From a qualitative standpoint, the load transmission data add nothing new in the field of flexible paving design. Stated in general terms, the effects of pavement thickness, tire inflation pressure, pavement stiffness, and subgrade stiffness have been known for a long time, either through experience or through theoretical studies. What the load transmission project has done is to express these general relationships in specific figures which can be used in the design and evaluation of pavements.

It must be recognized, of course, that a pavement may fail from any one of three major causes: (1) deterioration from weather or other environmental conditions; (2) shearing failure or plastic flow within the pavement structure itself; or (3) subgrade distortion or displacement caused by a lack of load distribution in the overlying pavement. The third type of failure is very common and is the only one related directly to the load transmission studies.

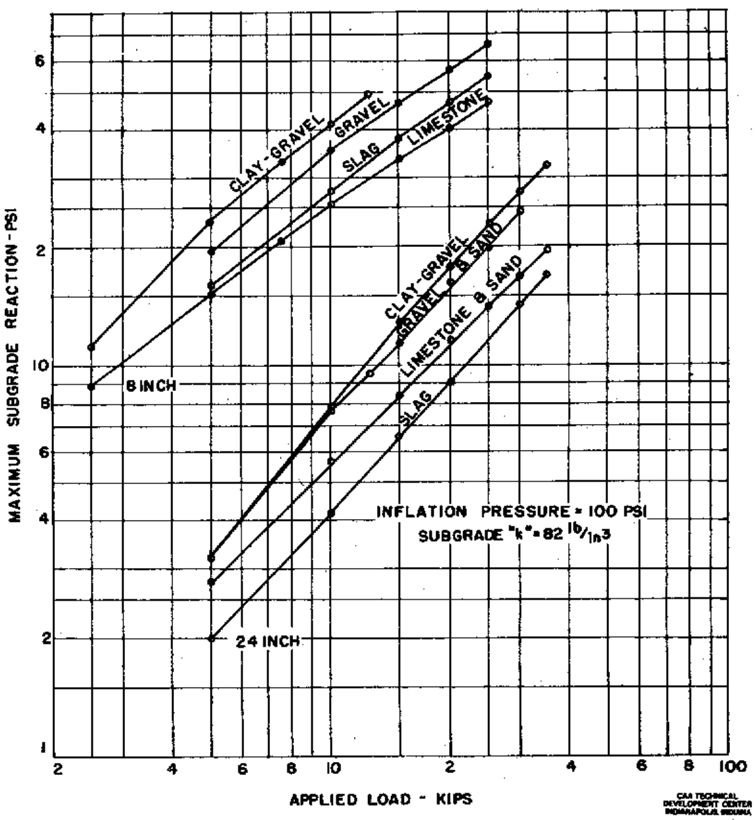

Fig. 7 Effect of Pavement Strength

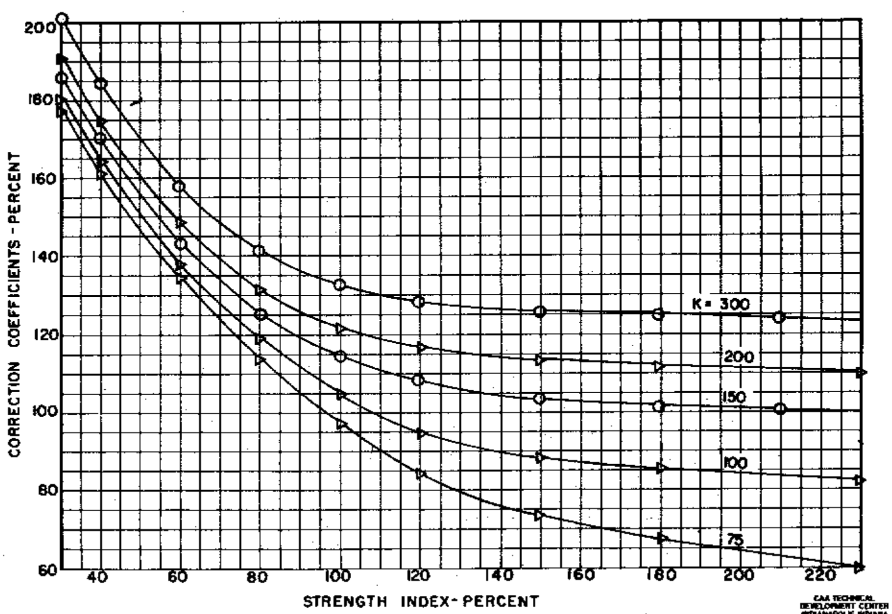

Fig. 8 Correction Coefficients

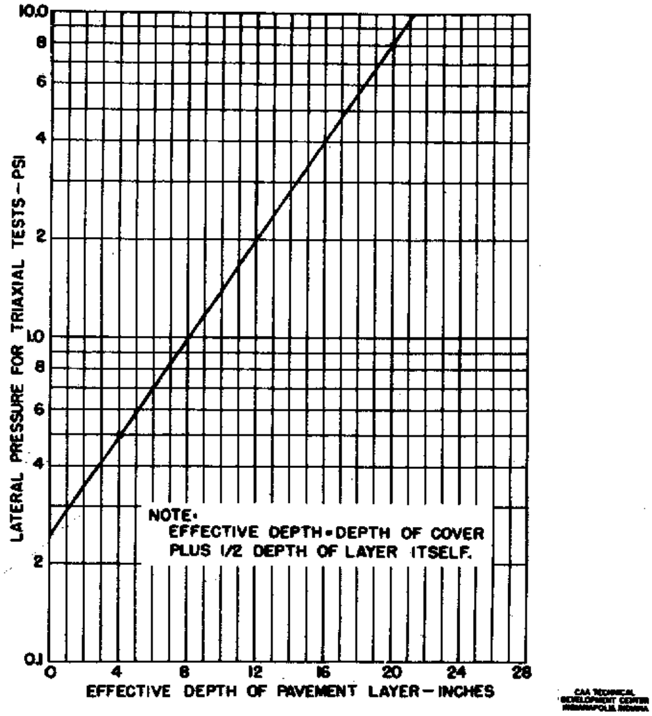

Fig. 9 Determination of Lateral Pressure for Triaxial Tests

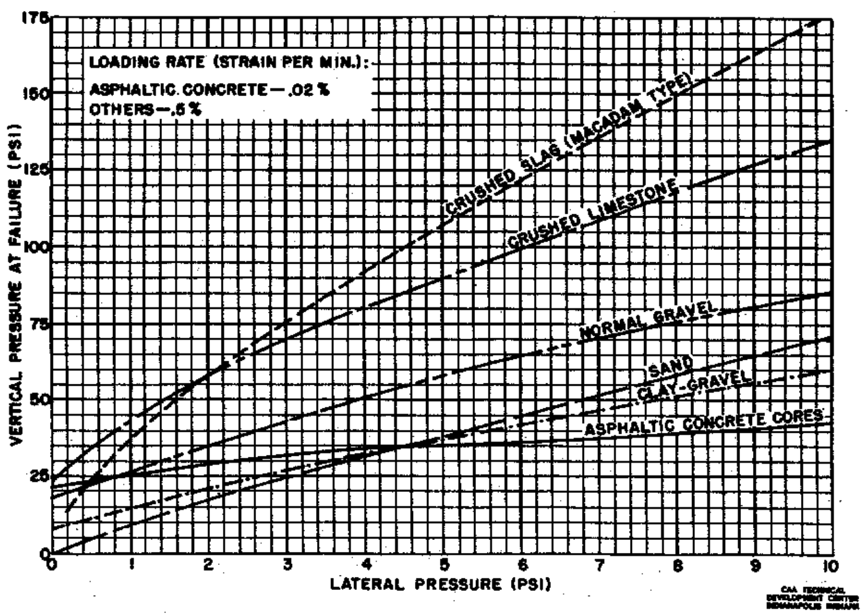

Fig. 10 Triaxial Test Data - Relationship of Principal Stresses

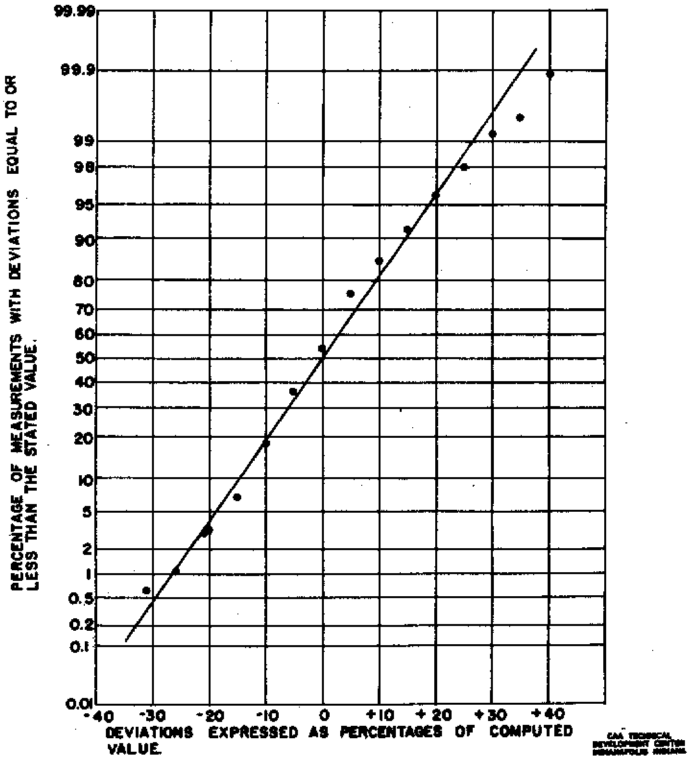

Fig. 11 Deviation of Measured Versus Computed Values

Stress values predicted from the load transmission data may be used in checking theoretical thickness design formulas, in checking the shape and spacing of families of design curves, and in extending empirical design methods to areas not covered adequately by service experience. They also may be used directly in a method of thickness design based on a limiting stress or deflection in the subgrade. For a specific design problem, it will be necessary to determine or assume the critical load, tire inflation pressure, and subgrade modulus, and the strength indexes of the materials under consideration for the various pavement layers.

The limiting subgrade deflection for a single load application may vary roughly from 0.025- to 0.25-inch for a given design problem, depending primarily upon the expected frequency of load application and the design life of the pavement. Deflection measurements from the Western Association of State Highway Officials (WASHO) and the American Association of State Highway Officials (AASHO) test roads, from military traffic tests, and from many universities and highway departments should prove valuable in setting the limit for a specific design condition.

It has been suggested that shear deformation or radius of surface curvature might be a better criterion of impending failure than would vertical subgrade stress or deformation. These suggestions are sound but tend to ignore the practical difficulties of measuring or computing the critical values involved. There certainly is ample evidence from both the field and the laboratory of a relationship between vertical deflection and failure. Evidence of an increasing interest in this relationship is given by the emphasis on deflection measurements of one type or another in the WASHO and AASHO road tests.

Although the triaxial test is the only strength test used extensively for comparing different materials in this CAA program, it is entirely possible that some other test could be used for this purpose. It would be necessary to know: (1) that the test could handle the various materials in their normal field condition of moisture and density; (2) that it would simulate to a reasonable degree the field conditions of loading or stress development; and (3) that the measured quality or characteristic would be directly related to the stress resistance or strength of the whole structure.

One point of particular importance in pavement design is the time rate of loading. The critical pavement areas on airports are the aprons and taxiways upon which the loads are either static or moving slowly. The situation is somewhat different on highways except in urban areas, particularly at intersections. All of this simply suggests that the time rate of loading in the basic strength test should be consistent with field loading conditions.

The load transmission test is a static test, corresponding to the most severe condition of airport paving design. The related triaxial tests were run at low rates of loading in order to minimize dynamic effects and provide a fair basis of comparison. Limited tests at other loading rates indicated that the asphaltic concrete was much more sensitive to this variable than were the granular materials. This implies better comparative performance under conditions of short-duration loading, and is consistent with the WASHO traffic tests. It is hoped that this effect can be studied further in subsequent research programs.

CONCLUSIONS

1. Data from 804 test loadings have been generalized into curves from which the maximum subgrade reaction can be predicted for a wide range of flexible pavement sections and loading conditions.
2. The generalized data may be used directly in a pavement thickness design method based on a limiting subgrade deflection, or they may be used to supplement or extend other design methods.
3. Although further refinements are possible, particularly in the correlation between load test data and strength tests of materials, the relationships given in this report are considered accurate enough for practical design use.

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APPENDIX*

TABLE I

LOAD-TRANSMISSION TEST DATA

Single Tires

Subgrade K = 150 Lbs./In.^{3}

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1214	Gravel	4	50	85	2.5	19
1215					5.0	31
1216					7.5	40
1217					12.5	52
1218					17.5	61
1219					25.0	71
1220					32.5	78
1221	Gravel	4	100	85	2.5	18
1222					5.0	32
1223					10.0	54
1224					15.0	69
1225					20.0	81
1226					25.0	91
1227					30.0	99
1228					35.0	106
1207	Gravel	8	50	90	2.5	8
1208					5.0	16
1209					7.5	21
1210					12.5	32
1211					17.5	39
1212					25.0	49
1213					32.5	56
1339	Gravel	8	100	47	2.5	14
1340					5.0	26
1341					10.0	46
1342					17.5	71
1343					25.0	89
1344					40.0	116

*Test Data Not Included in Previous Reports.

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1198	Gravel	8	100	90	2.5	8
1199					5.0	16
1200					10.0	34
1201					17.5	51
1202					25.0	65
1203					32.5	77
1204					40.0	87
1205					50.0	99
1206					60.0	109
1357	Gravel	8	100	95	2.5	12
1358					5.0	21
1359					10.0	37
1360					17.5	55
1361					21.0	62
1362					40.0	90
1363	Gravel	8	100	95	2.5	9
1364					5.0	17
1365					10.0	31
1366					17.5	47
1367					25.0	60
1368					40.0	80
1369					60.0	101
1253	Gravel	8	100	110	5.0	23
1254					10.0	36
1255					17.5	53
1256					25.0	66
1257					32.5	77
1258					40.0	86
1259					60.0	107
1345	Gravel	8	200	47	2.5	14
1346					5.0	28
1347					12.5	63
1348					17.5	81
1349					25.0	105

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1135	Gravel	8	200	100	2.5	10
1136					5.0	19
1137					12.5	45
1138					17.5	60
1139					25.0	79
1140					35.0	97
1141					42.5	116
1268	Gravel	16	50	115	2.5	3
1269					5.0	6
1270					7.5	8
1271					12.5	13
1272					17.5	18
1273					25.0	23
1274					35.0	29
1190	Gravel	16	100	100	5.0	5
1191					10.0	12
1192					17.5	22
1193					25.0	31
1194					32.5	39
1195					40.0	47
1196					50.0	55
1197					60.0	63
1127	Gravel	16	200	110	5.0	7
1128					12.5	19
1129					17.5	28
1130					25.0	41
1131					35.0	55
1132					42.5	65
1133					50.0	75
1134					60.0	86
1182	Gravel	24	100	111	5.0	3
1183					10.0	6
1184					17.5	11
1185					25.0	16
1186					32.5	21
1187					40.0	26
1188					50.0	32
1189					60.0	38
1350	Gravel	24	200	72	2.5	1
1351					5.0	3
1352					12.5	11
1353					17.5	17
1354					25.0	25
1355					42.5	46
1356					60.0	64

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1119	Gravel	24	200	120	5.0	3
1120					12.5	8
1121					17.5	12
1122					25.0	18
1123					35.0	26
1124					42.5	33
1125					50.0	38
1126					60.0	47
1323	Slag	4	50	51	2.5	23
1324					5.0	36
1325					10.0	53
1326					15.0	64
1327					25.0	79
1328					32.5	87
1318	Slag	4	100	51	2.5	28
1319					5.0	46
1320					10.0	72
1321					17.5	96
1322					25.0	114
1312	Slag	8	100	67	2.5	14
1313					5.0	25
1314					10.0	43
1315					17.5	64
1316					25.0	79
1317					40.0	103
1305	Slag	8	100	67	2.5	12
1306					5.0	22
1307					10.0	38
1308					17.5	57
1309					25.0	71
1310					40.0	93
1311					60.0	115
1229	Slag	8	100	128	2.5	11
1230					5.0	19
1231					10.0	31
1232					17.5	48
1233					25.0	60
1234					35.0	74
1235					45.0	86
1236					60.0	101
1298	Slag	24	100	112	2.5	1
1299					5.0	3
1300					10.0	6
1301					17.5	12
1302					25.0	17
1303					40.0	28
1304					60.0	40

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1275	Slag	24	100	160	2.5	1
1276					5.0	3
1277					10.0	5
1278					17.5	10
1279					25.0	14
1280					35.0	19
1281					45.0	24
1282					60.0	31
1283	Slag	24	200	170	2.5	2
1284					5.0	3
1285					10.0	6
1286					17.5	11
1287					25.0	16
1288					35.0	23
1289					45.0	29
1290					60.0	38
1106	Limestone	4	50	133	2.5	23
1107					5.0	35
1108					10.0	51
1109					15.0	61
1110					20.0	69
1111					25.0	75
1112					30.0	80
1113					35.0	84
1006	Limestone	4	100	155	1.0	11
1007					5.0	41
1008					10.0	63
1009					15.0	80
1010					20.0	92
1011					25.0	103
1012					30.0	113

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1114	Limestone	4	200	133	2.5	26
1115					5.0	47
1116					10.0	73
1117					12.5	85
1118					17.5	104
984	Limestone	8	100	157	2.5	10
985					5.0	18
986					7.5	25
987					10.0	31
988					15.0	42
989					20.0	52
990					25.0	60
991					30.0	68
992					35.0	75
1055	Limestone	8	200	165	5.0	20
1056					12.5	45
1057					17.5	58
1058					25.0	77
1059					27.0	82
1060					35.0	98
1061					42.5	111
1043	Limestone	12	100	153	5.0	12
1044					10.0	21
1045					17.5	33
1046					25.0	43
1047					35.0	55
1048					45.0	63
1084	Limestone	16	100	201	5.0	6
1085					10.0	12
1086					17.5	20
1087					25.0	27
1088					35.0	35
1089					42.5	43

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1076	Limestone	24	100	196	5.0	3
1077					12.5	8
1078					20.0	13
1079					25.0	15
1080					30.0	17
1081					42.5	23
1082					50.0	27
1083					60.0	31
1068	Limestone	24	200	182	5.0	3
1069					12.5	8
1070					17.5	12
1071					25.0	17
1072					30.0	20
1073					42.5	28
1074					50.0	32
1075					60.0	38
1161	Asphaltic Concrete	8	100	200	5.0	16
1162					10.0	28
1163					17.5	42
1164					25.0	54
1165					35.0	68
1166					42.5	76
1098	Composite 16 Inches Sand 8 Inches Gravel	24	100	66	5.0	3
1099					10.0	7
1100					15.0	11
1101					20.0	15
1102					25.0	19
1103					30.0	22
1104					35.0	26
1105					42.5	31

TABLE I (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1090	Composite	24	100	104	5.0	3
1091	16 Inches Sand				10.0	7
1092	8 Inches Limestone				15.0	11
1093					20.0	14
1094					25.0	17
1095					30.0	21
1096					35.0	24
1097					42.5	29

TABLE II

LOAD-TRANSMISSION TEST DATA

Single Tires

Subgrade K = 300 Lbs./In.^{3}

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1525	Gravel	4	50	105	2.5	23
1526					5.0	38
1527					10.0	57
1528					15.0	68
1529					25.0	85
1530					32.5	92
1531	Gravel	4	100	105	2.5	26
1532					5.0	46
1533					10.0	72
1534					17.5	98
1535					25.0	115
1536					40.0	138
1537					60.0	158
1580	Gravel	8	50	70	2.5	13
1581					5.0	23
1582					10.0	40
1583					15.0	52
1584					25.0	70
1585					32.5	79
1674	Gravel	8	50	91	2.5	12
1675					5.0	21
1676					10.0	34
1677					15.0	45
1678					25.0	61
1679					32.5	70
1573	Gravel	8	100	70	2.5	15
1574					5.0	28
1575					10.0	47
1576					17.5	71
1577					25.0	90
1578					40.0	120
1579					60.0	146

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1473	Gravel	8	100	90	2.5	11
1474					5.0	22
1475					10.0	39
1476					17.5	59
1477					25.0	74
1478					40.0	95
1479					60.0	117
1480	Gravel	8	200	90	2.5	10
1481					5.0	18
1482					12.5	43
1483					17.5	57
1484					25.0	75
1485					42.5	111
1486					60.0	139
1667	Gravel	8	200	91	2.5	14
1668					5.0	26
1669					12.5	63
1670					17.5	81
1671					25.0	107
1672					42.5	152
1673					60.0	183
1586	Gravel	16	50	100	2.5	4
1587					5.0	7
1588					10.0	14
1589					15.0	19
1590					25.0	29
1591					32.5	35
1538	Gravel	16	100	106	2.5	3
1539					5.0	7
1540					10.0	14
1541					17.5	24
1542					25.0	34
1543					40.0	50
1544					60.0	68

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1599	Gravel	16	200	70	2.5	4
1600					5.0	8
1601					12.5	22
1602					17.5	32
1603					25.0	46
1604					42.5	71
1605					60.0	92
1566	Gravel	24	100	68	2.5	1
1567					5.0	3
1568					10.0	8
1569					17.5	16
1570					25.0	24
1571					40.0	39
1572					60.0	57
1592	Gravel	24	100	105	2.5	1
1593					5.0	3
1594					10.0	7
1595					17.5	13
1596					25.0	18
1597					40.0	29
1598					60.0	42
1660	Gravel	24	200	93	2.5	1
1661					5.0	3
1662					12.5	10
1663					17.5	14
1664					25.0	19
1665					42.5	34
1666					60.0	49
1654	Sand	8	50	35	2.5	16
1655					5.0	28
1656					10.0	49
1657					15.0	63
1658					25.0	81
1659					32.5	92

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1647	Sand	8	100	35	2.5	17
1648					5.0	34
1649					10.0	63
1650					17.5	89
1651					25.0	111
1652					40.0	139
1653					60.0	165
1627	Limestone	4	50	172	2.5	25
1628					5.0	39
1629					10.0	58
1630					15.0	71
1631					25.0	84
1632					32.5	91
1620	Limestone	4	100	172	2.5	28
1621					5.0	46
1622					10.0	71
1623					17.5	97
1624					25.0	115
1625					40.0	139
1626					60.0	157
1714	Limestone	8	50	190	2.5	11
1715					5.0	19
1716					10.0	32
1717					15.0	42
1718					25.0	57
1719					32.5	65
1707	Limestone	8	100	190	2.5	15
1708					5.0	26
1709					10.0	44
1710					17.5	63
1711					25.0	79
1712					40.0	100
1713					60.0	123

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1545	Limestone	8	100	203	2.5	12
1546					5.0	23
1547					10.0	40
1548					17.5	58
1549					25.0	73
1550					40.0	95
1551					60.0	116
1552	Limestone	8	200	203	2.5	12
1553					5.0	23
1554					12.5	53
1555					17.5	71
1556					25.0	92
1557					42.5	131
1558					60.0	161
1687	Limestone	16	50	229	2.5	3
1688					5.0	6
1689					10.0	12
1690					15.0	17
1691					25.0	26
1692					32.5	32
1559	Limestone	16	100	246	2.5	4
1560					5.0	7
1561					10.0	14
1562					17.5	23
1563					25.0	31
1564					40.0	45
1565					60.0	60
1606	Limestone	16	200	180	2.5	4
1607					5.0	7
1608					12.5	19
1609					17.5	27
1610					25.0	40
1611					42.5	65
1612					60.0	84

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1613	Limestone	24	100	200	2.5	2
1614					5.0	4
1615					10.0	7
1616					17.5	12
1617					25.0	17
1618					40.0	25
1619					60.0	36
1680	Limestone	24	200	154	2.5	2
1681					5.0	3
1682					12.5	8
1683					17.5	12
1684					25.0	17
1685					42.5	30
1686					60.0	43
1700	Asphaltic Concrete	8	100	125	2.5	15
1701					5.0	28
1702					10.0	48
1703					17.5	71
1704					25.0	91
1705					40.0	117
1706					60.0	139
1693	Asphaltic Concrete	8	200	125	2.5	13
1694					5.0	27
1695					12.5	62
1696					17.5	84
1697					25.0	109
1698					42.5	157
1699					60.0	191

TABLE II (continued)

LOAD-TRANSMISSION TEST DATA

Test No.	Pavement Type	Pavement Thickness (inches)	Inflation Pressure (psi)	Strength Index (per cent)	Applied Load (kips)	Maximum Subgrade Reaction (psi)
1633	Composite	16	100	73	2.5	3
1634	8 Inches Sand				5.0	7
1635	8 Inches Gravel				10.0	15
1636					17.5	27
1637					25.0	38
1638					40.0	56
1639					60.0	77
1640	Composite	24	100	89	2.5	1
1641	16 Inches Sand				5.0	3
1642	8 Inches Limestone				10.0	7
1643					17.5	13
1644					25.0	18
1645					40.0	30
1646					60.0	45

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