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December 8, 1977

H.2.77

MEMO TO: G. F. Kemper
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SUBJECT: Research Report 485; "Flexible Pavement Designs to Support Various Vehicle Configurations"

If it were feasible and practical to manufacture highway truck-trains having perfect tracking and guidance capabilities in the trailing axles, bulk raw-materials, such as ores, coals, logs, and farm products could be transported on the highways more efficiently than by some simpler styles of trucks presently used and presently being overloaded by some owners or operators. These ideas issue from the "centipede concept" which fostered railroads and freight trains. Indeed: "The essential and unique thing about a railroad is the track" (**This Fascinating Railroad Business**, Robt. S Henry; Bobbs-Merrill; 1942). A tractor pulling a semi-trailer (a C5A, etc.) is perhaps the simplest form of a truck-train; certainly, a tractor and semi-trailer pulling a complete trailer qualifies as a train. Such units are legal in some states, but usually on four-lane highways only. This is because they have such limited steerability and(or) maneuverability.

Heretofore, pavement design engineers generally have merely sought to sustain current limits (statutory) on axleloads -- that is, to avoid destructive and catastrophic damage to pavements and premature depletion, or ruination, of physical assets. Premature (in this context) implies that it occurs before the responsible agency is fiscally capable of restoring and maintaining the system under the newer circumstances created. Relatively, the damage done by a single axle increases in a geometric progression presently defined by $(1.2504)^{P-18}$, where P is the axleload in thousands of pounds (Research Report 269, et seq.) It is recognized that increasing the size (width and diameter) of wheels, number of tires, and(or) number of wheels per axle reduces the damage and(or), in other words, enables increases in axleloads (which includes payloads) without increasing damage. These factors should be, and perhaps are being, considered by automotive designers and manufacturers of trucks.

Neither the report submitted herewith nor this brief commentary addresses the safe loads (load limits) or potential damage to bridges. Any legislative action contemplated should, necessarily, be based on similar analyses of wheel loads, axle configurations, and surely the important factor of gross load of a truck or truck-train(s).

Respectfully submitted,

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Attachment
cc's: Research Committee

Research Report
485

FLEXIBLE PAVEMENT DESIGNS TO SUPPORT VARIOUS VEHICLE CONFIGURATIONS

by

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December 1977

FLEXIBLE PAVEMENT DESIGNS
TO SUPPORT VARIOUS VEHICLE CONFIGURATIONS

INTRODUCTION

Pavement designers are often asked if pavements can be designed to carry and support the unusually heavy loads which have been known to use portions of the highway system. In some instances, for example, haul roads leading to highway or other construction projects or haul roads associated with mining, heavy loads have become commonplace and extra-legal. Within limitations of engineering experience, there appears to be no reason why pavements cannot be designed for these heavy loads. Of course, the restrictive factor in implementing such designs may be the excessive costs of construction. Even so, excessive maintenance costs otherwise associated with heavy loads on inadequate pavements could make the design and construction of super-duty pavements economically feasible. The background and framework of a flexible pavement design schema have been reported previously.

DESIGN ASSUMPTIONS

For purposes of this report, certain assumptions have been made to reduce the number of variables and to represent typical conditions in Kentucky. Designs were prepared for three configurations of trucks -- a single unit, three-axle truck (SU3A); a combination, five-axle truck (C5A); and a combination, six-axle truck (C6A). Three or four gross weights for each configuration were investigated. Table 1 summarizes the data for the eleven configuration-weight combinations which were used. Note that Vehicles A and B (SU3A), E and F (C5A), and I (C6A) are currently legal; the other vehicles are extra-legal. Tare weights for the vehicles are based on brochures published by truck and trailer manufacturers -- Ford, Mack, and City Welding and Manufacturing Co.

The traffic streams have been assumed to consist only of a single vehicle type and weight inasmuch as relative effects of vehicles are of primary interest. To further describe the traffic stream, four daily vehicle volumes -- 100, 200, 400, and 600 trips per day -- over time periods of 2, 4, 6, and 10 years were used.

Tables 2, 3, and 4 summarize thickness designs for new pavements for CBR's of 5, 15, and 30, respectively. These CBR's represent a range of subgrade support values from a "typical" Kentucky soil to a high-quality rock subgrade. Designs for four percentages of asphaltic concrete thickness in the total thickness -- 33, 50, 67, and 100 (full-depth asphaltic concrete) -- are tabulated.

Tables 5 and 6 summarize overlay designs for an existing pavement assumed to be 6 inches of asphaltic concrete over 6 inches of dense graded aggregate. This was the average of cores obtained from KY 15 in Wolfe County. Table 5 is for a CBR of 5; Table 6 is for a CBR of 15. Another significant variable in the design of overlays is the degree of deterioration allowed before the overlay is placed. Degrees of deterioration are represented indirectly by pavement serviceability indices of 3.0, 2.5, and 2.0 in Tables 5 and 6.

DESIGN OF NEW PAVEMENTS

Tables 2, 3, and 4 summarize designs for new pavements. Figure 1, for a CBR of 5, re-emphasizes the concept, often articulated by researchers, that a small incremental increase in thickness increases life expectancy by a significant factor. For less than about two million 18-kip equivalent axleloads (EAL's), depending upon the percentage of asphaltic concrete thickness in the total thickness, the addition of 1.0 to 1.5 inches will double the design life. Above two million 18-kip EAL's, the additional thickness needed to double the life expectancy increases rapidly. The rate of increase in additional thickness is again a function of the percentage of asphaltic concrete in the total thickness. Note that, for full-depth asphaltic concrete pavements, an additional inch of thickness will double life expectancies -- even for very large numbers of repetitions of 18-kip EAL's. Similar analyses for other CBR's indicate the same general relationships and trends.

Figure 2 depicts the significant increases attainable in payloads with C5A and C6A vehicles compared to SU3A trucks. For any horizontal line in Figure 2, the damage to the pavement is the same; however, the C6A, for example, can carry an additional payload of approximately 63 kips. This illustrates the significant increases in payloads which can be realized with no increase in pavement damage if appropriate vehicles are used. In Figure 3, the increases in payloads as well as gross loads of the C5A and C6A trucks are expressed in terms of percentage increase compared to SU3A trucks. As in Figure 2, any horizontal line represents the same damage to the pavement. For a damage factor of five, for example, the gross load of a C5A truck is about 61 percent greater than that of an equivalent SU3A vehicle; the payload is about 230 percent greater. For a C6A truck, the gross load is approximately 91 percent greater; and the payload is 280 percent greater.

Consider a SU3A-type vehicle having a gross weight of 80,000 pounds and a payload of 50,000 pounds (Vehicle C in Table 1). It is realized this vehicle is extra-legal; but it is also recognized that it is a typical vehicle on some coal-haul roads in Kentucky. The damage factor for a single trip of such a vehicle is approximately 42. A C6A truck having a gross weight of 100,000 pounds and a payload of 70,000 pounds has a damage factor of about 3. It would require approximately 14 trips of the C6A vehicle to inflict the same damage to the pavement as one trip of the SU3A truck. The payload for the C6A trips would be about 980,000 pounds compared to the 50,000 pounds for the single trip of the SU3A. This is almost a 19-fold increase in payload with no additional damage to the pavement. This emphasizes the importance of vehicle configuration in minimizing damage to pavements.

OVERLAY DESIGNS

Tables 5 and 6 summarize overlay designs for an existing pavement consisting of 6 inches asphaltic concrete over 6 inches of dense graded aggregate. A significant problem in overlay design is the evaluation of the structural capability of the existing pavement. A procedure is currently being developed and has progressed sufficiently to provide a basis for the overlay designs summarized herein. The level to which pavement deterioration is allowed to progress is indicated by the pavement serviceability index (PSI); in this analysis, three levels of PSI were selected -- 3.0, 2.5, and 2.0.

Figure 4, for a CBR of 5, shows a relationship similar to that shown in Figure 1. For less than about six million 18-kip equivalent axleloads, an additional 1 to 1.2 inches of overlay will double the life expectancy of the overlay. Above about six million EAL's, the additional overlay required to double the life of the overlay increases as a function of the design EAL for the overlay. This relationship is the same, regardless of the serviceability index at which the pavement is overlaid and is generally the same for a wide range of CBR values.

For high-type pavements, it is suggested that resurfacing be accomplished at a PSI of 3.0 (for interstate-type roadways, resurfacing may even be done at a PSI of 3.25). If the pavement is allowed to deteriorate to lesser PSI's, increased overlay thicknesses will be required. In Figure 5, it is noted that approximately an additional 1.75 inches of overlay is required if the pavement is resurfaced at a PSI of 2.5 rather than at a PSI of 3.0. Allowing the pavement to deteriorate to a PSI of 2.0 requires about 3 inches more overlay than if the pavement were resurfaced at a PSI of 3.0.

RECOMMENDATIONS

If the legal gross weights for certain vehicle configurations could be increased to 100,000 pounds, there could result a many-fold increase in payload, or an extension of the design period, with no or little increase (assuming there are now many extra-legal vehicles presently on the road) in damage to the pavement. The other side to such an arrangement would be a commitment by the trucking industry not to load certain vehicle configurations (such as the SU3A truck) beyond the current legal limits and would require a stepped-up level of enforcement with regard to these critical vehicle types. Such a compromise between legal limits and practices in the trucking industry could have a significant economic impact upon the state (minimizing the annual costs of maintenance) and the trucking industry (increased payload per trip).

It is recognized that the larger vehicle configurations may require certain geometrics which may not exist on some highways. Thus, the concept of staging areas and of transshipping may need to be implemented. Transfer centers would need to be developed where the smaller vehicles (such as SU3A trucks) could bring short-haul payloads to be transferred to the more favorable (from payload and pavement damage point of view) vehicles, such as C5A and C6A trucks, for the long hauls.

Highway agencies may well consider the advisability of increasing the thickness of new pavement designs by 1 to 1.5 inches. This additional thickness would provide a margin of safety against premature failure and need for resurfacing for those highways where it is difficult to predict future traffic characteristics and conditions.

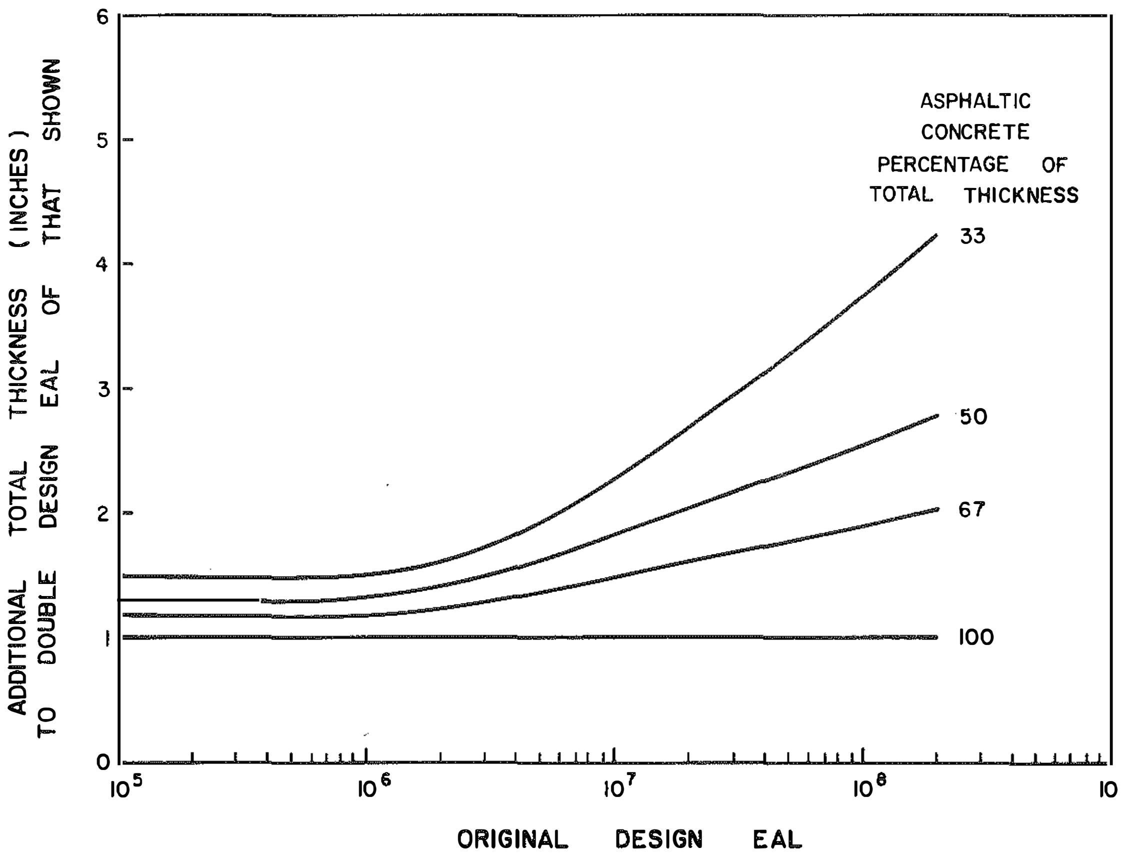

Figure 1. Additional Thickness Required to Double the Life Expectancy of New Pavements as a Function of Design EAL and Percentage of Asphaltic Concrete Thickness in the Total Thickness.

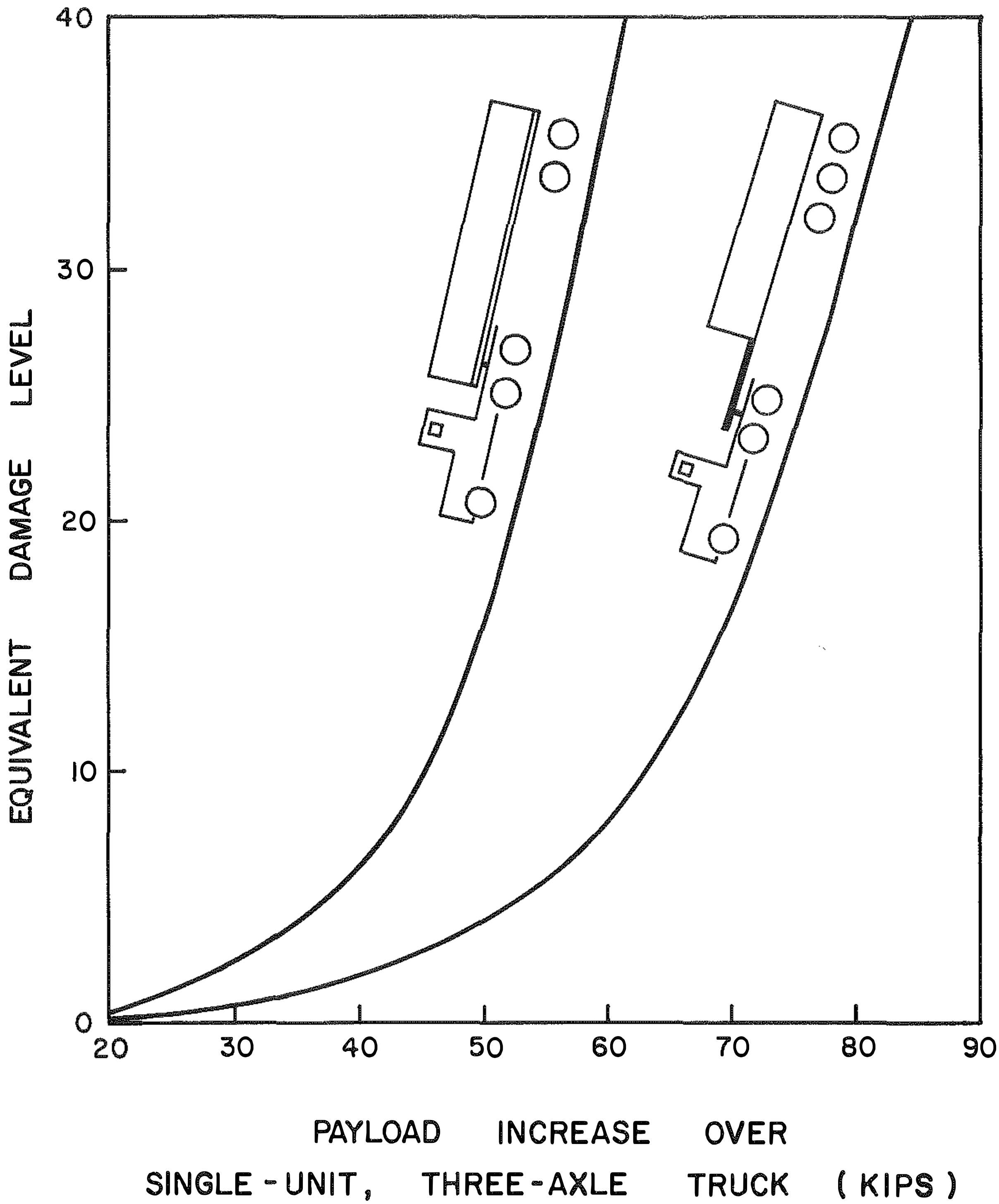

Figure 2. Increase in Payloads of C5A and C6A Vehicles over a SU3A Truck.

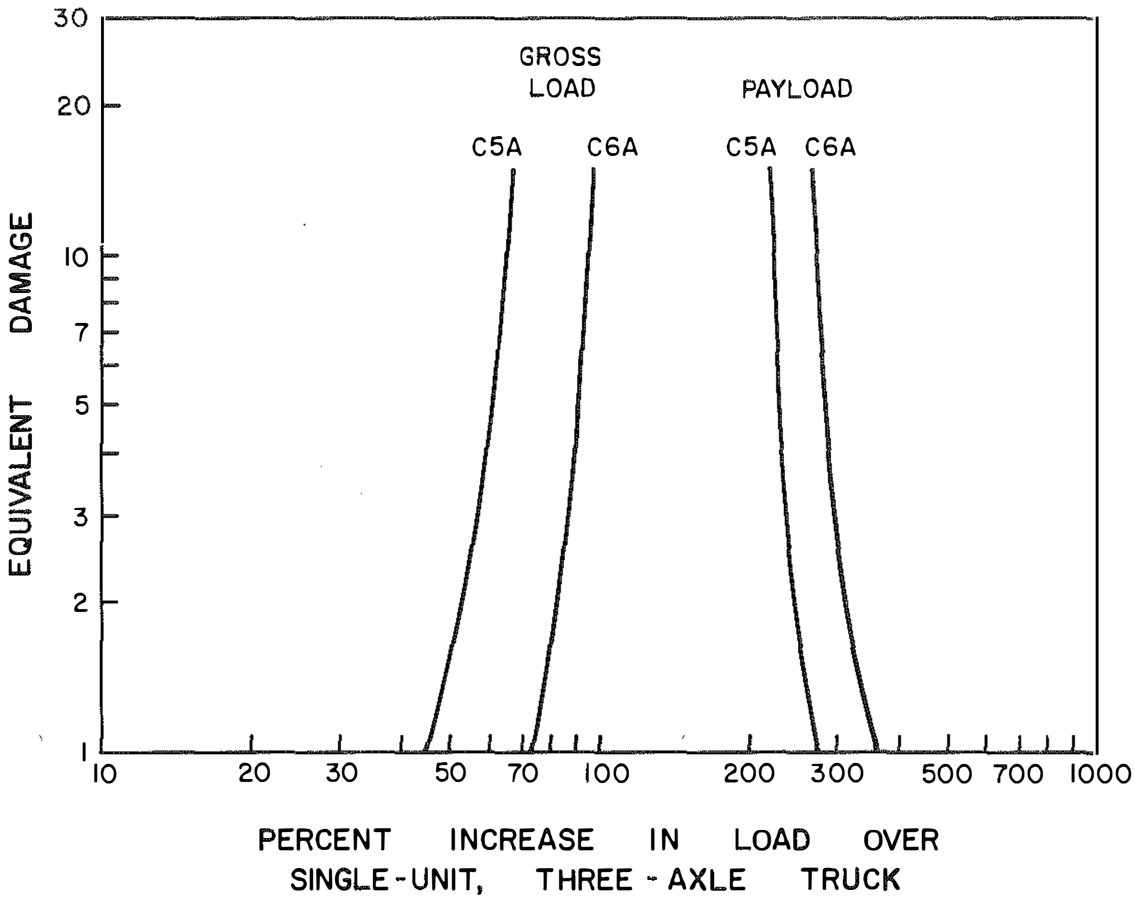

Figure 3. Percentage Increase in Gross Loads and Payloads of C5A's and C6A's over a SU3A Truck.

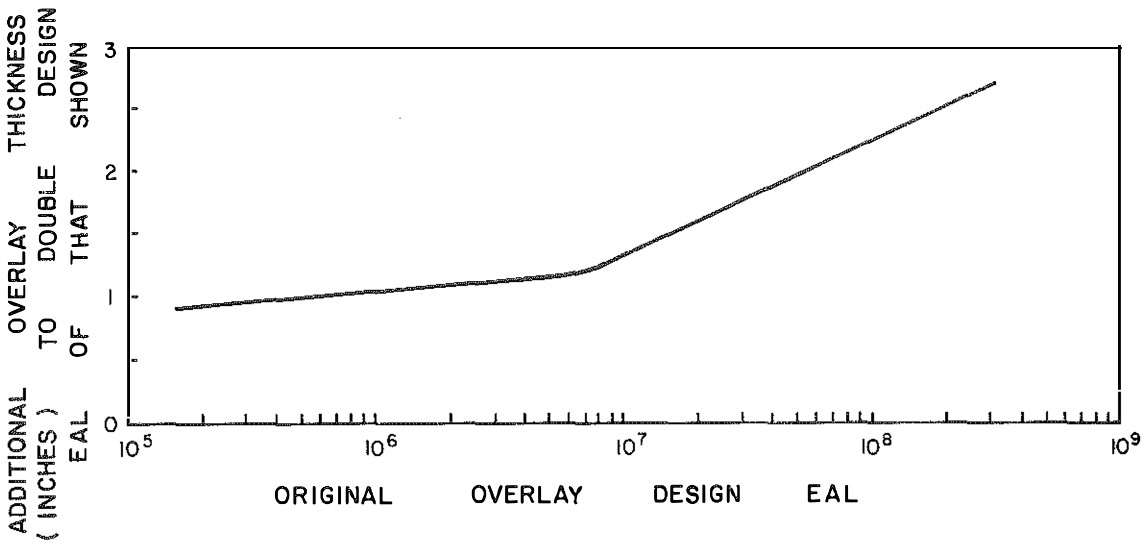

Figure 4. Additional Overlay Thickness Required to Double the Life Expectancy of the Overlay; CBR = 5.

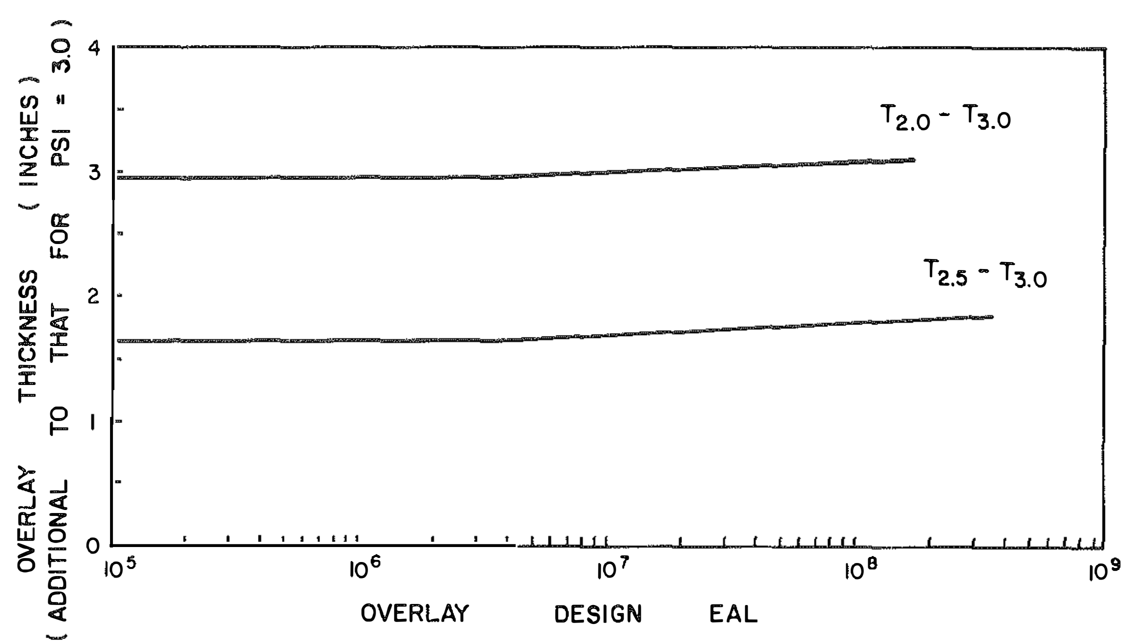

Figure 5. Effect of Terminal Pavement Serviceability Index on Thickness of Overlay Required.

TABLE 1. SUMMARY OF VEHICLE CONFIGURATIONS, WEIGHTS, AND 18-KIP EAL'S PER TRUCK

		FRONT		REAR		TRACTOR		TRAILER						
VEHICLE NUMBER	VEHICLE TYPE	AXLELOAD*	18-KIP EAL	TANDEM AXLELOAD	18-KIP EAL	TANDEM AXLELOAD	18-KIP EAL	TANDEM AXLELOAD	18-KIP EAL	TRI-AXLE AXLELOAD	18-KIP EAL	TOTAL WEIGHT	PAYLOAD**	TOTAL 18-KIP EAL'S PER TRIP
A	SU3A	9,600	0.264	34,000	0.968							43,600	13,600	1.232
B	SU3A	14,000	0.755	34,000	0.968							48,000	18,000	1.723
C	SU3A	14,000	0.755	66,000	41.346							80,000	50,000	42.101
D	SU3A	20,000	3.755	80,000	213.730							100,000	70,000	217.485
E	C5A	9,600	0.264			34,000	0.968	34,000	0.968			77,600	49,600	2.200
F	C5A	12,000	0.443			34,000	0.968	34,000	0.968			80,000	52,000	2.379
G	C5A	9,600	0.264			35,200	1.114	35,200	1.114			80,000	52,000	2.492
H	C5A	14,000	0.755			43,000	2.782	43,000	2.782			100,000	72,000	6.319
I	C6A	6,000	0.096			30,000	0.607			44,000	0.662	80,000	50,000	1.365
J	C6A	9,600	0.264			34,000	0.968			50,000	1.084	93,600	63,600	2.316
K	C6A	9,600	0.264			36,000	1.224			54,400	1.555	100,000	70,000	3.043

*Axleloads in excess of 9,600 pounds are assumed to use flotation tires.
**Empty weights by vehicle type:

SU3A = 30,000 pounds
C5A = 28,000 pounds
C6A = 30,000 pounds

TABLE 2. DESIGNS OF NEW PAVEMENTS; CBR = 5

VEHICLE NUMBER	YEARS	100 TRIPS PER DAY 18-KIP EAL*, MILLIONS	100 TRIPS: DESIGN THICKNESS, PERCENT AC 33	50	67	100	200 TRIPS PER DAY 18-KIP EAL*, MILLIONS	200 TRIPS: DESIGN THICKNESS, PERCENT AC 33	50	67	100	400 TRIPS PER DAY 18-KIP EAL*, MILLIONS	400 TRIPS: DESIGN THICKNESS, PERCENT AC 33	50	67	100	600 TRIPS PER DAY 18-KIP EAL*, MILLIONS	600 TRIPS: DESIGN THICKNESS, PERCENT AC 33	50	67	100
A	2	0.074	14.7	11.3	9.5	7.5	0.148	16.2	12.7	10.7	8.4	0.296	17.7	14.2	11.9	9.4	0.444	18.5	15.0	12.7	10.0
	4	0.148	16.2	12.7	10.7	8.4	0.296	17.7	14.2	11.9	9.4	0.591	19.1	15.6	13.2	10.4	0.887	20.0	16.9	14.0	11.1
	6	0.222	17.1	13.6	11.4	8.9	0.444	18.5	15.0	12.7	10.0	0.887	20.0	16.9	14.0	11.1	1.331	20.9	17.3	14.8	11.8
	10	0.370	18.2	14.6	12.3	9.7	0.739	19.6	16.1	13.6	10.8	1.478	21.2	17.5	15.0	12.0	2.218	22.2	18.5	15.8	12.5
B	2	0.103	15.4	12.0	10.1	7.9	0.207	16.9	13.4	11.3	8.8	0.414	18.4	14.8	12.5	9.9	0.620	19.2	15.7	13.3	10.9
	4	0.207	16.9	13.4	11.3	8.8	0.414	18.4	14.8	12.5	9.9	0.827	19.9	16.3	13.9	11.0	1.241	20.8	17.2	14.7	11.6
	6	0.310	17.8	14.2	12.0	9.4	0.620	19.2	15.7	13.3	10.9	1.241	20.8	17.2	14.7	11.6	1.861	22.7	18.0	15.5	12.3
	10	0.517	18.9	15.3	12.9	10.2	1.034	20.4	16.8	14.4	11.3	2.068	22.0	18.3	15.7	12.4	3.101	23.0	19.2	16.6	13.0
C	2	2.526	22.5	18.7	16.1	12.7	5.052	24.4	20.4	17.7	13.7	10.104	26.7	22.3	19.3	14.7	15.156	28.2	24.3	20.5	15.3
	4	5.052	24.4	20.4	17.7	13.7	10.104	26.7	22.3	19.3	14.7	20.208	29.3	25.2	21.2	15.7	30.313	29.3	26.5	22.0	16.3
	6	7.578	25.7	21.5	18.7	14.3	15.156	28.2	24.3	20.5	15.3	30.313	31.1	26.5	22.0	16.3	45.469	33.1	28.0	22.7	16.8
	10	12.630	27.5	22.9	19.8	15.0	25.261	30.3	25.9	21.4	16.0	50.521	33.7	28.3	23.4	17.0	75.782	35.9	29.7	24.3	17.5
D	2	13.049	27.6	24.1	20.0	15.0	26.098	30.4	26.0	21.9	16.0	52.196	33.9	28.4	23.5	17.0	78.295	36.1	29.9	24.3	17.3
	4	26.098	30.4	26.0	21.9	16.0	52.196	33.9	28.4	23.5	17.0	104.393	37.8	31.0	24.9	18.0	156.589	40.1	32.6	26.2	19.0
	6	39.147	32.4	27.4	22.8	16.6	78.295	36.1	29.9	24.3	17.6	156.589	40.1	32.6	26.2	19.0	234.884		34.5	27.0	20.0
	10	65.225	35.1	29.2	24.1	17.3	130.491	39.0	31.9	25.4	18.5	260.980		34.8	27.4	20.2	391.473				21.2
E	2	0.132	15.9	12.5	10.5	8.2	0.264	17.4	13.9	11.7	9.2	0.528	18.9	15.3	13.0	10.2	0.792	19.8	16.2	13.8	10.9
	4	0.264	17.4	13.9	11.7	9.2	0.528	18.9	15.3	13.0	10.2	1.056	20.4	16.8	14.3	11.3	1.584	21.3	17.7	15.1	12.1
	6	0.396	18.3	14.7	12.5	9.8	0.792	19.8	16.2	13.8	10.9	1.584	21.3	17.7	15.1	12.1	2.376	22.3	18.6	16.0	12.6
	10	0.660	19.4	15.8	13.4	10.6	1.320	20.9	17.3	14.8	11.8	2.640	22.6	18.8	16.2	12.8	3.960	23.7	19.8	17.1	13.4
F	2	0.143	16.1	12.7	10.6	8.3	0.285	17.6	14.1	11.9	9.3	0.571	19.1	15.5	13.1	10.4	0.856	19.9	16.3	13.9	11.0
	4	0.285	17.6	14.1	11.9	9.3	0.571	19.1	15.5	13.1	10.4	1.142	20.6	17.0	14.5	11.5	1.713	21.5	17.9	15.3	12.2
	6	0.428	18.4	14.9	12.6	9.9	0.856	19.9	16.3	13.9	11.0	1.713	21.5	17.9	15.3	12.2	2.569	22.6	18.8	16.2	12.7
	10	0.714	19.6	15.9	13.5	10.7	1.427	21.1	17.5	15.0	11.8	2.855	22.9	19.0	16.4	12.9	4.282	24.1	20.0	17.3	13.5
G	2	0.150	16.2	12.8	10.7	8.4	0.299	17.7	14.2	11.9	9.4	0.598	19.2	15.6	13.2	10.4	0.897	20.1	16.4	14.0	11.1
	4	0.299	17.7	14.2	11.9	9.4	0.598	19.2	15.6	13.2	10.4	1.196	20.7	17.1	14.6	11.6	1.794	21.6	18.0	15.4	12.2
	6	0.449	18.5	15.0	12.7	10.0	0.897	20.1	16.4	14.0	11.1	1.794	21.6	18.0	15.4	12.2	2.691	22.7	18.9	16.3	12.8
	10	0.748	19.7	16.1	13.6	10.8	1.495	21.2	17.5	15.0	12.0	2.990	23.0	19.1	16.5	13.0	4.486	24.1	20.1	17.4	13.5
H	2	0.379	18.2	14.8	12.4	9.7	0.758	19.7	16.1	13.7	10.8	1.517	20.7	17.5	15.1	12.0	2.275	22.3	18.5	15.9	12.6
	4	0.758	19.7	16.1	13.7	10.8	1.517	20.7	17.5	15.1	12.0	3.033	23.0	19.1	16.5	13.0	4.550	24.1	20.1	17.4	13.5
	6	1.137	20.6	17.0	14.5	11.5	2.275	22.3	18.5	15.9	12.6	4.550	24.1	20.1	17.4	13.5	6.825	25.4	21.2	18.5	14.1
	10	1.896	21.8	18.0	15.5	12.3	3.791	23.6	19.7	17.0	13.3	7.583	25.7	21.5	18.6	14.3	11.374	27.1	22.6	19.5	14.8
I	2	0.082	14.9	11.5	9.6	7.6	0.164	14.9	13.0	10.9	8.5	0.328	17.9	14.4	12.1	9.5	0.491	18.7	15.2	12.8	10.1
	4	0.164	16.4	13.0	10.9	8.5	0.328	17.9	14.4	12.1	9.5	0.655	19.4	15.8	13.4	10.6	0.983	20.3	16.6	14.1	11.2
	6	0.246	17.3	13.8	11.6	9.1	0.491	18.7	15.2	12.8	10.1	0.983	20.3	16.6	14.1	11.2	1.474	21.2	17.5	15.0	11.9
	10	0.410	18.4	14.8	12.5	9.9	0.819	19.9	16.2	13.8	10.9	1.638	21.4	17.7	15.2	12.1	2.457	22.4	18.6	16.1	12.7
J	2	0.139	16.0	12.6	10.6	8.3	0.278	17.5	14.0	11.8	9.3	0.556	19.0	15.4	13.1	10.3	0.834	19.9	16.3	13.9	11.0
	4	0.278	17.5	14.0	11.8	9.3	0.556	19.0	15.4	13.1	10.3	1.112	19.5	16.9	14.5	11.4	1.668	21.5	17.8	15.3	12.1
	6	0.417	18.4	15.3	12.5	9.9	0.834	19.9	16.3	13.9	11.0	1.668	21.5	17.8	15.3	12.1	2.501	22.5	18.7	16.1	12.7
	10	0.695	19.5	15.9	13.5	10.7	1.390	21.0	17.4	14.9	11.8	2.779	22.8	18.9	16.3	12.8	4.169	23.8	19.9	17.2	13.4
K	2	0.183	16.6	13.2	11.1	8.7	0.365	18.1	14.6	12.3	9.7	0.730	19.6	16.0	13.6	10.8	1.095	20.5	16.9	14.4	11.4
	4	0.365	18.1	14.6	12.3	9.7	0.730	19.6	16.0	13.6	10.8	1.461	21.1	17.5	15.0	11.9	2.191	22.2	18.4	15.8	12.5
	6	0.548	19.0	15.4	13.1	10.3	1.095	20.5	16.9	14.4	11.4	2.191	22.2	18.4	15.8	12.5	3.286	23.2	19.3	16.7	13.1
	10	0.913	20.1	16.5	14.0	11.1	1.826	21.7	18.0	15.5	12.3	3.650	23.5	19.6	16.9	13.2	5.477	24.7	20.6	17.9	13.8

*Based on 300 working days per year.

TABLE 3. DESIGNS OF NEW PAVEMENTS; CBR = 15

		100 TRIPS PER DAY					200 TRIPS PER DAY					400 TRIPS PER DAY					600 TRIPS PER DAY				
			DESIGN THICKNESS					DESIGN THICKNESS					DESIGN THICKNESS					DESIGN THICKNESS			
		18-KIP* EAL, MILLIONS	PERCENT AC				18-KIP* EAL, MILLIONS	PERCENT AC				18-KIP* EAL, MILLIONS	PERCENT AC				18-KIP* EAL, MILLIONS	PERCENT AC			
VEHICLE NUMBER	YEARS		33	50	67	100		33	50	67	100		33	50	67	100		33	50	67	100
A	2	0.074	9.0	7.2	6.2	5.2	0.148	10.2	8.4	7.3	6.0	0.296	11.7	9.7	8.4	6.9	0.444	12.5	10.4	9.1	7.5
	4	0.148	10.2	8.4	7.3	6.0	0.296	11.7	9.7	8.4	6.9	0.591	13.1	10.9	9.1	7.9	0.887	10.3	11.7	10.3	8.5
	6	0.222	11.1	9.1	8.0	6.6	0.444	12.5	10.4	9.1	7.5	0.887	13.9	11.7	10.3	8.5	1.331	14.8	12.5	11.0	9.2
	10	0.370	12.1	10.1	8.8	7.2	0.739	13.5	11.4	10.0	8.3	1.478	15.0	12.7	11.2	9.3	2.218	16.0	13.5	11.9	10.0
B	2	0.103	9.5	7.8	6.8	5.6	0.207	9.0	9.0	7.9	6.5	0.414	12.3	10.3	9.4	7.4	0.620	13.2	11.0	9.7	8.0
	4	0.207	11.0	9.0	7.9	6.5	0.414	12.3	10.3	9.4	7.4	0.827	13.8	11.6	10.2	8.4	1.241	14.7	12.4	10.9	9.0
	6	0.310	11.8	9.7	8.5	7.0	0.620	13.2	11.0	9.7	8.0	1.241	14.7	12.4	10.9	9.0	1.861	15.5	13.2	11.6	9.7
	10	0.517	12.8	10.7	9.8	7.7	1.034	14.3	12.0	10.6	8.8	2.068	15.8	13.4	11.8	9.9	3.101	16.8	14.2	12.5	10.6
C	2	2.526	16.3	13.8	12.1	10.2	5.052	18.0	15.3	12.1	11.4	10.104	19.9	16.9	15.0	12.4	15.156	21.1	18.0	16.1	13.0
	4	5.052	18.0	15.3	13.5	11.4	10.104	19.9	16.9	15.0	12.4	20.208	22.1	18.9	16.8	13.4	30.313	23.6	20.2	18.0	14.0
	6	7.578	19.0	16.2	14.3	12.1	15.156	21.1	18.0	16.1	13.0	30.313	23.6	20.2	18.0	14.0	45.469	25.1	21.6	19.8	14.6
	10	12.630	20.6	17.5	15.6	12.7	25.261	22.9	19.6	17.5	13.8	50.521	25.5	22.1	19.2	14.8	75.782	27.1	23.6	20.7	15.4
D	2	13.049	20.7	19.1	15.7	12.8	26.098	23.0	19.7	17.5	13.8	52.196	25.6	22.2	19.3	14.8	78.295	27.2	23.8	20.9	15.4
	4	26.098	23.0	19.7	17.5	13.8	52.196	25.6	22.2	19.3	14.8	104.393	28.5	25.5	21.8	15.9	156.589	30.3	27.0	22.8	16.5
	6	39.147	24.5	21.1	18.6	14.4	78.295	27.2	23.8	20.9	15.4	156.589	30.3	27.0	22.8	16.5	234.884	32.3	28.4	23.3	17.1
	10	65.225	26.5	23.1	20.3	15.2	130.491	29.5	26.3	23.3	16.2	260.980	33.0	29.0	23.7	17.2	391.473	34.9	30.6	24.7	17.9
E	2	0.132	10.0	8.2	7.2	5.9	0.264	11.5	9.4	8.3	6.8	0.528	12.9	10.7	9.4	7.8	0.792	13.7	11.5	10.1	8.4
	4	0.264	11.5	9.4	8.3	6.8	0.528	12.9	10.7	9.4	7.8	1.056	14.3	12.1	10.6	8.8	1.584	15.2	12.8	11.3	9.4
	6	0.396	12.3	10.2	8.9	7.4	0.792	13.7	11.5	10.1	8.4	1.584	15.2	12.8	11.3	9.4	2.376	16.1	13.7	12.0	10.1
	10	0.660	13.3	11.2	9.8	8.1	1.320	14.8	12.5	11.0	9.1	2.640	16.4	13.9	12.2	10.3	3.960	17.4	14.8	13.0	11.0
F	2	0.143	10.2	8.3	7.3	6.0	0.285	11.6	9.6	8.4	6.9	0.571	13.0	10.9	9.5	7.9	0.856	13.8	11.7	10.2	8.5
	4	0.285	11.6	9.6	8.4	6.9	0.571	13.0	10.9	9.5	7.9	1.142	14.5	12.2	10.7	8.9	1.713	15.3	13.0	11.4	9.5
	6	0.428	12.4	10.7	9.0	7.5	0.856	13.8	11.7	10.2	8.5	1.713	15.3	13.0	11.4	9.5	2.569	16.3	13.8	12.2	10.2
	10	0.714	13.5	11.3	9.9	8.2	1.427	14.9	12.6	11.1	9.3	2.855	16.6	14.0	12.4	10.4	4.282	17.6	14.9	13.2	11.1
G	2	0.150	10.3	8.4	7.4	6.0	0.299	11.7	9.7	8.5	7.0	0.598	13.1	11.0	9.6	8.0	0.897	13.9	11.7	10.5	8.6
	4	0.299	11.7	9.7	8.5	7.0	0.598	13.1	11.0	9.6	8.0	1.196	14.6	12.3	10.8	9.0	1.794	15.5	13.1	11.5	9.6
	6	0.449	12.5	10.4	9.1	7.5	0.897	13.9	11.7	10.5	8.6	1.794	15.5	13.1	11.5	9.6	2.691	16.4	13.9	12.2	10.3
	10	0.748	13.6	11.4	10.0	8.3	1.495	15.0	12.7	11.2	9.3	2.990	16.7	14.1	12.4	10.5	4.486	17.7	15.0	13.3	11.2
H	2	0.379	12.2	10.1	8.8	7.3	0.758	13.6	11.4	10.0	8.3	1.517	15.1	12.8	11.2	9.4	2.275	16.0	13.6	12.0	10.0
	4	0.758	13.6	11.4	10.0	8.3	1.517	15.1	12.8	11.2	9.4	3.033	16.7	14.2	12.5	10.5	4.550	17.7	15.0	13.3	11.2
	6	1.137	14.5	12.2	10.7	8.9	2.275	16.0	13.6	12.0	10.0	4.550	17.7	15.0	13.3	11.2	6.825	18.8	16.0	14.1	12.0
	10	1.896	15.6	13.2	11.6	9.7	3.791	17.3	14.7	12.9	10.9	7.583	19.0	16.2	14.4	12.1	11.374	20.3	17.3	15.3	12.6
I	2	0.082	9.0	7.3	6.4	5.3	0.164	10.5	8.6	7.5	6.2	0.328	11.9	9.8	8.6	7.1	0.491	12.7	10.6	9.3	7.7
	4	0.164	10.5	8.6	7.5	6.2	0.328	11.9	9.8	8.6	7.1	0.655	13.3	11.2	9.8	8.1	0.983	14.2	11.9	10.5	8.7
	6	0.246	11.3	9.3	8.2	6.7	0.491	12.7	10.6	9.3	7.7	0.983	14.2	11.9	10.5	8.7	1.474	15.0	12.7	11.2	9.3
	10	0.410	12.3	10.3	9.1	7.4	0.819	13.8	11.6	10.1	8.4	1.638	15.3	12.9	11.4	9.5	2.457	16.2	13.7	12.1	10.2
J	2	0.139	10.1	8.3	7.3	6.0	0.278	11.6	9.5	8.4	6.9	0.556	12.9	10.8	9.5	7.8	0.834	13.8	11.6	10.2	8.5
	4	0.278	11.6	9.5	8.4	6.9	0.556	12.9	10.8	9.5	7.8	1.112	14.4	12.2	10.7	8.9	1.668	15.3	12.9	11.4	9.5
	6	0.417	12.3	10.3	9.0	7.4	0.834	13.8	11.6	10.2	8.5	1.668	15.3	12.9	11.4	9.5	2.501	16.2	13.8	12.1	10.2
	10	0.695	13.4	11.3	9.9	8.2	1.390	14.9	12.6	11.1	9.2	2.779	16.5	14.0	12.3	10.4	4.169	17.5	14.8	13.1	11.1
K	2	0.183	10.7	8.8	7.7	6.3	0.365	12.1	10.0	8.8	7.2	0.730	13.5	11.4	9.9	8.3	1.095	14.4	12.1	10.6	8.9
	4	0.365	12.1	10.0	8.8	7.2	0.730	13.5	11.4	9.9	8.3	1.461	15.0	12.7	11.1	9.3	2.191	15.9	13.5	11.9	10.0
	6	0.548	12.9	10.8	9.4	7.8	1.095	14.4	12.1	10.6	8.9	2.191	15.9	13.5	11.9	10.0	3.286	16.9	14.3	12.6	10.7
	10	0.913	14.0	11.8	10.3	8.6	1.826	15.5	13.1	11.5	9.7	3.650	17.2	14.6	12.9	10.9	5.477	18.2	15.4	13.7	11.6

Note: *Based on 300 working days per year.

TABLE 4. DESIGNS OF NEW PAVEMENTS; CBR = 30

VEHICLE NUMBER	YEARS	100 TRIPS PER DAY: 18-KIP* EAL, MILLIONS	100: DESIGN THICKNESS, PERCENT AC 33	50	67	100	200 TRIPS PER DAY: 18-KIP* EAL, MILLIONS	200: DESIGN THICKNESS, PERCENT AC 33	50	67	100	400 TRIPS PER DAY: 18-KIP* EAL, MILLIONS	400: DESIGN THICKNESS, PERCENT AC 33	50	67	100	600 TRIPS PER DAY: 18-KIP* EAL, MILLIONS	600: DESIGN THICKNESS, PERCENT AC 33	50	67	100
A	2	0.074	9.0	6.0	4.5	3.5	0.148	9.0	6.0	5.0	4.3	0.296	9.0	6.6	6.1	5.2	0.444	9.0	7.4	6.6	5.7
	4	0.148	9.0	6.0	5.0	4.3	0.296	9.0	6.6	6.1	5.2	0.591	9.0	8.0	7.1	6.1	0.887	9.9	8.9	7.7	6.7
	6	0.222	9.0	6.0	5.5	4.8	0.444	9.0	7.4	6.6	5.7	0.887	9.9	8.9	7.7	6.7	1.331	10.9	9.7	8.3	7.3
	10	0.370	9.0	7.1	6.3	5.5	0.739	9.5	8.5	7.4	6.4	1.478	11.1	9.9	8.6	7.5	2.218	12.1	10.8	9.2	8.1
B	2	0.103	9.0	6.0	4.6	3.9	0.207	9.0	6.0	5.4	4.7	0.414	9.0	7.3	6.5	5.6	0.620	9.1	8.1	7.1	6.2
	4	0.207	9.0	6.0	5.4	4.7	0.414	9.0	7.3	6.5	5.6	0.827	9.8	8.8	7.6	6.6	1.241	10.7	9.7	8.3	7.2
	6	0.310	9.0	6.7	6.0	5.2	0.620	9.1	8.1	7.1	6.2	1.241	10.7	9.7	8.3	7.2	1.861	11.6	10.5	8.7	7.8
	10	0.517	9.0	7.8	6.9	5.9	1.034	10.3	9.2	8.0	6.9	2.068	11.9	10.7	8.9	8.0	3.101	12.9	11.5	9.7	8.6
C	2	2.526	12.4	10.9	9.4	8.3	5.052	14.3	12.5	11.4	9.5	10.104	16.3	14.1	13.1	10.8	15.156	17.5	15.1	13.4	11.5
	4	5.052	14.3	12.5	10.7	9.5	10.104	16.3	14.1	13.1	10.8	20.208	18.3	15.8	14.1	12.1	30.313	19.6	16.9	15.0	12.6
	6	7.578	15.4	13.4	11.6	10.2	15.156	17.5	15.0	13.4	11.5	30.313	19.6	16.9	15.0	12.6	45.469	20.9	18.0	16.2	13.1
	10	12.630	16.9	14.5	12.8	11.1	25.261	19.0	16.4	14.5	12.4	50.521	21.2	18.3	16.4	13.3	75.782	22.6	19.6	17.6	13.8
D	2	13.049	17.0	14.6	12.9	11.2	26.098	19.1	16.5	14.5	12.4	52.196	21.3	18.4	16.5	13.3	78.295	22.9	19.7	17.7	13.9
	4	26.098	19.1	16.5	14.5	12.4	52.196	21.3	18.4	16.5	13.3	104.393	23.8	20.5	18.2	14.3	156.589	25.4	21.8	19.2	14.8
	6	39.147	20.4	17.6	15.8	12.9	78.295	22.9	19.7	17.7	13.9	156.589	25.4	21.8	19.2	14.8	234.884	27.1	23.4	20.2	15.4
	10	65.225	22.1	19.1	17.4	13.6	130.491	24.7	21.2	18.7	14.6	260.980	27.5	23.6	20.5	15.6	391.473	29.3	24.9	21.5	16.2
E	2	0.132	9.0	6.0	5.0	4.2	0.264	9.0	6.4	5.8	5.0	0.528	9.0	7.8	7.1	6.0	0.792	9.6	8.6	7.6	6.5
	4	0.264	9.0	6.4	5.7	5.0	0.528	9.0	7.8	7.1	6.0	1.056	10.3	9.2	8.1	7.0	1.584	11.3	10.2	8.9	7.6
	6	0.396	9.0	7.2	6.4	5.6	0.792	9.6	8.6	7.6	6.5	1.584	11.3	10.2	8.9	7.6	2.376	12.3	11.0	9.6	8.2
	10	0.660	9.2	8.3	7.2	6.3	1.320	10.8	9.9	9.2	7.3	2.640	12.5	11.2	9.8	8.4	3.960	13.6	12.0	11.1	9.0
F	2	0.143	9.0	6.0	5.0	4.3	0.285	9.0	6.6	6.0	5.1	0.571	9.0	8.0	7.1	6.1	0.856	9.8	8.8	7.8	6.7
	4	0.285	9.0	6.6	6.1	5.1	0.571	9.0	8.0	7.1	6.1	1.142	10.5	9.4	8.3	7.1	1.713	11.4	10.4	9.0	7.7
	6	0.428	9.0	7.3	6.5	5.7	0.856	9.8	8.8	7.8	6.7	1.713	11.4	10.4	9.0	7.7	2.569	12.5	11.1	9.7	8.3
	10	0.714	9.4	8.4	7.5	6.4	1.427	11.0	10.0	8.9	7.4	2.855	12.7	11.3	9.9	8.5	4.282	13.8	12.2	11.3	9.2
G	2	0.150	9.0	6.0	5.0	4.3	0.299	9.0	6.6	6.1	5.2	0.598	9.0	8.1	7.1	6.1	0.897	9.9	8.9	7.9	6.7
	4	0.299	9.0	6.6	6.1	5.2	0.598	9.0	8.1	7.1	6.1	1.196	10.6	9.5	8.2	7.2	1.794	11.6	10.4	9.0	7.8
	6	0.449	9.0	7.5	6.5	5.7	0.897	9.9	8.9	7.9	6.7	1.794	11.6	10.4	9.0	7.8	2.691	12.6	11.2	9.8	8.4
	10	0.748	9.5	8.5	7.6	6.5	1.495	11.1	10.1	9.0	7.5	2.990	12.9	11.4	10.0	8.6	4.486	13.9	12.3	11.4	9.3
H	2	0.379	9.0	7.1	6.4	5.5	0.758	9.6	8.6	7.6	6.5	1.517	11.2	10.1	9.0	7.5	2.275	12.2	10.9	9.5	8.1
	4	0.758	9.6	8.6	7.6	6.5	1.517	11.2	10.1	9.0	7.5	3.033	12.9	11.5	10.0	8.6	4.550	14.0	12.3	10.5	9.3
	6	1.137	10.5	9.4	8.1	7.1	2.275	12.2	10.9	9.5	8.1	4.550	14.0	12.3	10.5	9.3	6.825	15.1	13.2	11.6	10.0
	10	1.896	11.7	10.4	9.0	7.9	3.791	13.3	11.9	11.0	9.0	7.583	15.4	13.4	11.8	10.2	11.374	16.6	14.3	12.5	11.0
I	2	0.082	9.0	6.0	4.6	3.6	0.164	9.0	6.0	5.0	4.4	0.328	9.0	6.8	6.2	5.3	0.491	9.0	7.7	6.8	5.9
	4	0.164	9.0	6.0	5.0	4.4	0.328	9.0	6.8	6.2	5.3	0.655	9.2	8.3	7.3	6.3	0.983	10.2	9.1	8.1	6.9
	6	0.246	9.0	6.2	5.6	4.9	0.491	9.0	7.7	6.8	5.9	0.983	10.2	9.1	8.1	6.9	1.474	11.1	10.0	9.0	7.5
	10	0.410	9.0	7.3	6.5	5.6	0.819	9.8	8.7	8.0	6.6	1.638	11.4	10.3	9.1	7.6	2.457	12.4	11.0	9.6	8.2
J	2	0.139	9.0	6.0	4.9	4.2	0.278	9.0	6.5	6.1	5.1	0.556	9.0	8.0	7.0	6.0	0.834	9.8	8.8	7.8	6.6
	4	0.278	9.0	6.5	6.1	5.1	0.556	9.0	8.0	7.0	6.0	1.112	10.5	9.3	8.2	7.0	1.668	11.4	10.3	9.1	7.6
	6	0.417	9.0	7.3	6.4	5.6	0.834	9.8	8.8	7.8	6.6	1.668	11.4	10.3	9.1	7.6	2.501	12.4	11.1	9.7	8.3
	10	0.695	9.4	8.4	7.3	6.4	1.390	10.9	10.0	8.9	7.4	2.779	12.7	11.3		8.5	4.169	13.8	12.1	11.2	9.1
K	2	0.183	9.0	6.0	5.3	4.6	0.365	9.0	7.0	6.3	5.4	0.730	9.5	8.5	7.4	6.4	1.095	10.4	9.3	8.2	7.0
	4	0.365	9.0	7.0	6.3	5.4	0.730	9.5	8.5	7.4	6.4	1.461	11.0	10.0	8.9	7.4	2.191	12.0	10.8	9.5	8.1
	6	0.548	9.0	7.9	7.0	6.0	1.095	10.4	9.3	8.2	7.0	2.191	12.0	10.8	9.5	8.1	3.286	13.1	11.6	10.8	8.7
	10	0.913	10.0	8.9	7.7	6.7	1.826	11.6	10.5	9.0	7.8	3.650	13.4	11.8	11.0	8.9	5.477	14.5	12.7	11.4	9.6

Note: *Based on 300 working days per year.

TABLE 5. OVERLAY DESIGNS; CBR = 5; EXISTING PAVEMENT -- 6 INCHES ASPHALTIC CONCRETE ON 6 INCHES DGA

		100 TRIPS PER DAY				200 TRIPS PER DAY				400 TRIPS PER DAY				600 TRIPS PER DAY			
		18-KIP EAL'S,	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S,	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S,	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S,	PAVEMENT SERVICEABILITY INDEX		
VEHICLE NUMBER	YEARS	MILLIONS*	3.0	2.5	2.0	MILLIONS*	3.0	2.5	2.0	MILLIONS	3.0	2.5	2.0	MILLIONS*	3.0	2.5	2.0
C	2	2.526	6.7	8.3	9.6	5.052	7.9	9.5	10.9	10.104	9.2	10.9	12.3	15.156	10.1	11.9	13.3
	4	5.052	7.9	9.5	10.9	10.104	9.2	10.9	12.3	20.208	10.8	12.5	13.9	30.313	11.9	13.7	15.1
	6	7.578	8.6	10.3	11.7	15.156	10.1	11.9	13.3	30.313	11.9	13.7	15.1	45.469	13.1	14.8	16.2
	10	12.630	9.7	11.4	12.8	25.261	11.4	13.1	14.5	50.521	13.3	15.0	16.4	75.782	14.4	16.3	17.5
D	2	13.049	9.8	11.5	12.9	26.098	11.4	13.2	14.6	52.196	13.4	15.2	16.5	78.295	14.6	16.4	17.8
	4	26.098	11.4	13.2	14.6	52.196	13.4	15.2	16.5	104.393	15.6	17.4	18.7	156.589	17.1	18.9	20.1
	6	39.147	12.5	14.3	15.7	78.295	14.6	16.4	17.8	156.589	17.1	18.9	20.1	234.884	18.7	20.5	21.6
	10	65.225	14.0	15.8	17.2	130.491	16.4	18.2	19.5	260.980	19.1	20.9	22.1	391.473	21.0	22.7	23.7
G	2	0.150	2.5	4.2	5.5	0.299	3.5	5.1	6.4	0.598	4.4	6.1	7.4	0.897	5.0	6.7	8.0
	4	0.299	3.5	5.1	6.4	0.598	4.4	6.1	7.4	1.196	5.4	7.1	8.4	1.794	6.2	7.8	9.1
	6	0.449	4.0	5.7	7.0	0.897	5.0	6.7	8.0	1.794	6.2	7.8	9.1	2.691	6.8	8.4	9.7
	10	0.748	4.8	6.5	7.8	1.495	5.8	7.5	8.8	2.990	7.0	8.6	9.9	4.486	7.6	9.3	10.7
H	2	0.379	3.8	5.4	6.8	0.758	4.8	6.5	7.8	1.517	5.9	7.5	8.8	2.275	6.5	8.2	9.5
	4	0.758	4.8	6.5	7.8	1.517	5.9	7.5	8.8	3.033	7.0	8.6	9.9	4.550	7.7	9.4	10.7
	6	1.137	5.4	7.1	8.4	2.275	6.5	8.2	9.5	4.550	7.7	9.4	10.7	6.825	8.4	10.2	11.5
	10	1.896	6.2	7.9	9.2	3.791	7.4	9.0	10.4	7.583	8.6	10.3	11.7	11.374	9.5	11.2	12.6
I	2	0.082	1.6	3.2	4.6	0.164	2.7	4.3	5.6	0.328	3.6	5.2	6.5	0.491	4.2	5.8	7.1
	4	0.164	2.7	4.3	5.6	0.328	3.6	5.2	6.5	0.655	4.6	6.2	7.6	0.983	5.2	6.9	8.2
	6	0.246	3.2	4.8	6.1	0.491	4.2	5.8	7.1	0.983	5.2	6.9	8.2	1.474	5.8	7.5	8.8
	10	0.410	3.9	5.5	6.9	0.819	4.9	6.6	7.9	1.638	6.0	7.7	8.9	2.457	6.6	8.3	9.6
K	2	0.183	2.8	4.4	5.8	0.365	3.7	5.4	6.7	0.730	4.7	6.4	7.7	1.095	5.4	7.0	8.3
	4	0.365	3.7	5.4	6.7	0.730	4.7	6.4	7.7	1.461	5.8	7.5	8.8	2.191	6.5	8.1	9.4
	6	0.548	4.3	6.0	7.3	1.095	5.4	7.0	8.3	2.191	6.5	8.1	9.4	3.286	7.1	8.8	10.1
	10	0.913	5.1	6.8	8.0	1.826	6.2	7.8	9.1	3.650	7.3	9.0	10.3	5.477	8.0	9.7	11.1

*Based on 300 working days per year.

TABLE 6. OVERLAY DESIGNS; CBR = 15;
EXISTING PAVEMENT -- 6 INCHES ASPHALTIC
CONCRETE ON 6 INCHES DGA

		100 TRIPS PER DAY				200 TRIPS PER DAY				400 TRIPS PER DAY				600 TRIPS PER DAY			
		18-KIP EAL'S, MILLIONS*	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S, MILLIONS*	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S, MILLIONS*	PAVEMENT SERVICEABILITY INDEX			18-KIP EAL'S, MILLIONS*	PAVEMENT SERVICEABILITY INDEX		
VEHICLE NUMBER	YEARS		3.0	2.5	2.0		3.0	2.5	2.0		3.0	2.5	2.0		3.0	2.5	2.0
C	2	2.526	3.3	5.1	6.4	5.052	4.4	6.1	7.6	10.104	5.7	7.4	8.8	15.156	6.5	8.9	9.7
	4	5.052	4.4	6.1	7.6	10.104	5.7	7.4	8.8	20.208	7.1	8.9	10.3	30.313	8.1	9.9	11.3
	6	7.578	5.1	6.8	8.3	15.156	6.5	8.9	9.7	30.313	8.1	9.9	11.3	45.469	9.2	11.0	12.4
	10	12.630	6.2	7.9	9.3	25.261	7.6	9.4	10.8	50.521	9.5	11.3	12.6	75.782	10.7	12.5	13.9
D	2	13.049	6.2	7.9	9.4	26.098	7.7	9.5	11.0	52.196	9.6	11.3	13.0	78.295	10.8	12.6	14.2
	4	26.098	7.7	9.5	11.0	52.196	9.6	11.3	13.0	104.393	11.9	13.6	15.2	156.589	13.5	15.1	16.7
	6	39.147	8.8	10.5	12.1	78.295	10.8	12.6	14.2	156.589	13.5	15.1	16.7	234.884	15.3	16.8	18.5
	10	65.225	10.2	12.0	13.7	130.491	12.7	14.4	16.0	260.980	15.8	17.2	18.9	391.473	17.9	19.1	21.0
G	2	0.150	0.0	1.4	2.7	0.299	0.5	2.2	3.6	0.598	1.4	3.1	4.5	0.897	1.9	3.6	5.0
	4	0.299	0.5	2.2	3.6	0.598	1.4	3.1	4.5	1.196	2.3	4.0	5.4	1.794	2.8	4.6	6.0
	6	0.449	1.0	2.7	4.1	0.897	1.9	3.6	5.0	1.794	2.8	4.6	6.0	2.691	3.4	5.2	6.6
	10	0.748	1.7	3.4	4.8	1.495	2.6	4.3	5.7	2.990	3.6	5.3	6.7	4.486	4.2	5.9	7.4
H	2	0.379	0.8	2.5	3.9	0.758	1.7	3.4	4.8	1.517	2.2	3.9	5.3	2.275	3.1	4.9	6.3
	4	0.758	1.7	3.4	4.8	1.517	2.2	3.9	5.3	3.033	3.6	5.3	6.7	4.550	4.2	6.0	7.4
	6	1.137	2.2	3.9	5.3	2.275	3.1	4.9	6.3	4.550	4.2	6.0	7.4	6.825	4.9	6.6	8.1
	10	1.896	2.9	4.7	6.1	3.791	3.9	5.7	7.1	7.583	5.1	6.9	8.3	11.374	5.9	7.6	9.0
I	2	0.082	0.0	0.6	2.0	0.164	0.0	1.5	2.8	0.328	0.6	2.3	3.7	0.491	1.1	2.8	4.2
	4	0.164	0.0	1.5	2.8	0.328	0.6	2.3	3.7	0.655	1.5	3.2	4.6	0.983	2.0	3.7	5.1
	6	0.246	0.3	2.0	3.3	0.491	1.1	2.8	4.2	0.983	2.0	3.7	5.1	1.474	2.5	4.3	5.7
	10	0.410	0.9	2.6	4.0	0.819	1.8	3.5	4.9	1.638	2.7	4.5	5.9	2.457	3.3	5.0	6.4
K	2	0.183	0.0	1.6	3.0	0.365	0.8	2.5	3.8	0.730	1.6	3.3	4.7	1.095	2.2	3.9	5.3
	4	0.365	0.8	2.5	3.8	0.730	1.6	3.3	4.7	1.461	2.5	4.3	5.7	2.191	3.1	4.9	6.3
	6	0.548	1.3	3.0	4.4	1.095	2.2	3.9	5.3	2.191	3.1	4.9	6.3	3.286	3.7	5.5	6.9
	10	0.913	1.9	3.6	5.0	1.826	2.8	4.6	6.0	3.650	3.9	5.6	7.0	5.477	4.5	6.3	7.7

*Based on 300 working days per year.