Truck Sizes and Weights: A Scenario Analysis

C. Michael Walton and Dock Burke

The findings of a current study in the state of Texas to evaluate some of the effects of allowing larger and heavier trucks to operate on the highway system are presented. Four scenarios, each of which includes four to six vehicle classes, were studied to determine the effects each would have on highway bridge costs, truck operating costs, and fuel consumption over a 20-year planning period. One scenario represents the existing legal situation, and the other three range from a weight-only increase to variations in size and weight. City streets and county roads are not included in the analysis. One scenario that includes eastern-region double-trailer and triple-trailer combinations compares favorably with the current situation in terms of estimated highway costs. This scenario is characterized by truck units that have a maximum length of 32 m (105 ft), maximum width of 2.59 m (102 in), and gross vehicle weight (axle) of 468.9 kN (105 500 lbf) and retains the current bridge formula. A maximum truck unit height of 4.11 m (13.5 ft) is also retained. Savings in truck operating costs and fuel consumption are estimated to be significant. The full results for each scenario and highway class are given. The highway costs used in the analysis reflect costs related to pavements and bridges; they do not include any consideration of changes in geometric design conditions or costs associated with public safety.

Certain issues surrounding legal limits on the size and weight of vehicles have become a primary policy concern of government and the freight industry. Such concern is reflected by current federal initiatives (stemming from the Surface Transportation Act of 1978), related study activities, and actions of several state transportation agencies.

Fuel shortages and rapidly increasing fuel prices have provided an impetus for resolving many of the problems associated with vehicle sizes and weights. The underlying idea is frequently reflected in a simple relationship: Larger vehicles can carry more freight per unit of fuel. Fuel savings then becomes a measure of effectiveness by which to evaluate changes that will permit larger vehicles.

Although fuel conservation is important, however, it is only one of many measures that can be used in an analysis of the size and weight issues. We must not be misled into the widespread use of a "fuel theory of value" in which energy considerations are exclusively important. Even though the fuel-conservation aspect is of current interest, traditional dollar costs and dollar savings provide a clearer and more comprehensive measure of the effects of changes in vehicle sizes and weights.

In Texas, a study is under way to evaluate some of the effects of operating larger and heavier vehicles on the highway system. Initial results, obtained by using a study technique modified from NCHRP Report 141 (1), have shown estimated pavement costs, bridge costs, savings in truck operating costs, and fuel savings that would result from increases in limits on axle weight and gross vehicle weight. The work reported in this paper extends the previous analysis and allows for increases in vehicle length and width as well as in weight (2).

PREVIOUS TEXAS STUDY

In 1978, a study was undertaken to assess the effects of projected truck traffic on the Texas highway system. The study included the evaluation of costs and benefits for a 20-year planning horizon. Alternative scenarios of future truck traffic were assessed. The study did not consider the effects of changes in the size of trucks, only an increase in gross vehicle weight (GVW) and axle load. The effects of heavy trucks on county roads and city streets were not analyzed.

The study was organized into three phases:

1. Current and future truck-traffic distributions were established for each of two scenarios. Scenario A was evaluated as the conditions that would develop under the present weight laws. Scenario B was evaluated as the conditions that would develop under a possible future legal increase in weight limits.
2. The comparative costs required to maintain the state highway system in an acceptable condition while carrying the traffic estimated for both scenarios were evaluated.
3. The incremental benefits associated with the variation in conditions between scenarios A and B were evaluated, and these benefits were associated with the increased payloads of scenario B over scenario A.

The major approach in the 1978 study involved estimating the comparative maintenance and rehabilitation costs of maintaining the state highway system under current weight limitations and under different, future weight conditions. The incremental costs for scenarios A and B associated with heavier truck loads and the corresponding savings in truck operating and fuel costs for the 20-year period were computed for three highway classes. It was determined that, if changes in weight laws are undertaken, further analysis would be needed to select those routes that would carry relatively large freight tonnages and would cost relatively less to upgrade.

CURRENT APPROACH

The maximum weight of trucks on highways is currently limited by size and weight laws. Trucks that carry high-density commodities are limited by axle weight and GVW; trucks that carry low-density commodities are limited by the capacity (size) of the truck. Increased size and weight limits can increase truck capacity in at least three ways:

1. Retain the existing limit on size and increase the limit on axle weight and GVW,
2. Retain the limit on axle weight and increase the limit on size and GVW, or
3. Increase the limits on size, axle weight, and GVW.

These three measures will reduce energy consumption and truck operating costs, but they will also have an impact on the cost of highway rehabilitation, bridge cost, highway safety, highway geometric requirements, and the highway environment in general. The benefits of each measure must be valued against its cost.

Most highways are designed to withstand a specific number of 80-kN [18 000-lbf (18-kip)] single-axle-load repetitions. The passage of a 62.22-kN (14 000-lbf)

Table 1. Weight and length limits by scenario.

Scenario	Maximum Axle Load (kN) Single Axle	Maximum Axle Load (kN) Tandem Axle	Maximum GVW (kN) 1[a] (kN)	Maximum GVW (kN) 2[b] (kN)	Length (m)	Operations of Doubles and Triples
A	88.89	151.11	355.55		19.81	NP
B	160.00	195.55	533.33		19.81	NP
C	88.89	151.11	355.55	468.88	32.00	All highway classes
D	88.89	151.11	355.55	BF	32.00	All highway classes

Note: 1 kN = 224.8 lbf; 1 m = 3.28 ft.
NP = not permitted; BF = bridge formula governs.
[a] For vehicles and combinations 19.81 m or shorter.
[b] For eastern-region double- and triple-trailer combinations.

Figure 1. Selected truck configurations for scenarios A and B.

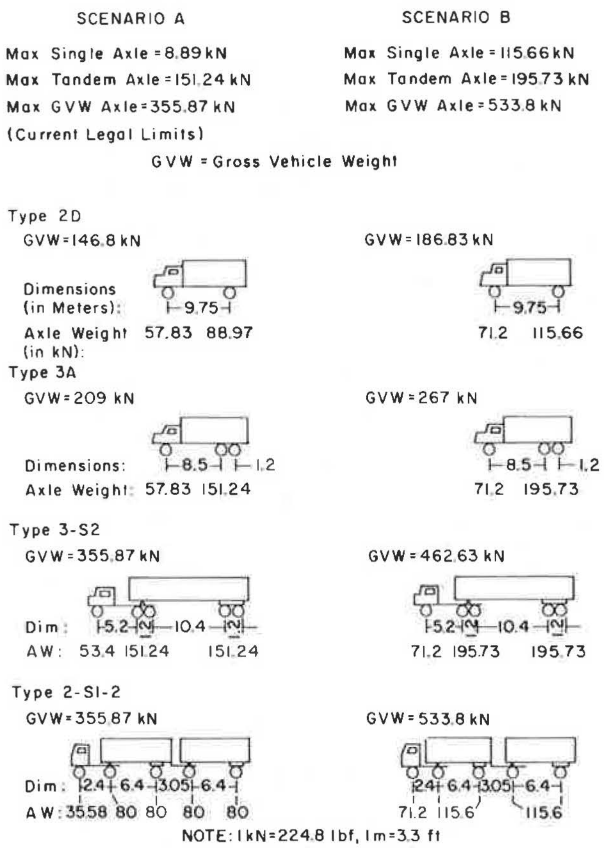
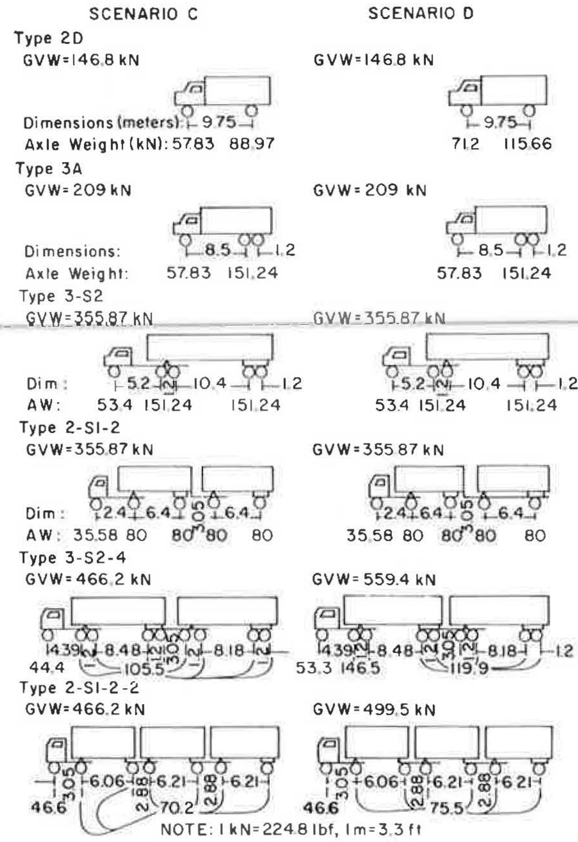


Figure 2. Selected truck configurations for scenarios C and D.



axle is equivalent to the passage of 0.34 80-kN single-axle load—about one-third the effect of an 80-kN axle load. The effect of axle load on pavement increases at a much faster rate than the corresponding increase in axle weight itself. A 97.77-kN (22 000-lbf) axle load is equivalent to 2.37 80-kN single-axle loads. Thus, the increase in axle weight will increase pavement damage and shorten pavement service life (3).

Changes in size and weight limits also affect bridges. Large trucks affect the geometric capacity of the bridge, particularly in vertical and horizontal clearance.

Changes in truck size can significantly affect highway geometric requirements. For example, longer and wider vehicles can increase the design standards for highway geometrics. A number of studies on the effects of various elements of vehicle size on highway geometrics have been initiated.

Highway safety is another major issue that must be considered. The operational safety of larger and heavier trucks on highways has been a very controversial issue. More research and data are needed for a better understanding of the issue (4). Research is also needed on the impact of larger and heavier trucks on noise, visual quality, and air pollution.

The Center for Transportation Research at the University of Texas at Austin, the Texas Transportation Institute at Texas A&M University, and the Texas State Department of Highways and Public Transportation (SDHPT) have developed a set of scenarios for use in evaluating the benefits and costs of increasing truck size and weight. Table 1 gives a brief summary of the four scenarios.

Scenario A represents the existing law and limits. Scenario B is a weight scenario in which axle weight and GVW limits increase but size does not. Scenarios C and D integrate size and weight options. Truck width is allowed to increase to 2.59 m (102 in) and truck length to 32 m (105 ft) maximum; height limits are restricted to the existing limit of 4.14 m (13.5 ft). Scenarios C and D differ only in axle weight and GVW for the double- and triple-trailer combinations.

A computer program known as TRUCKY was developed to calculate the operating costs, fuel consumption, total payload per 100 vehicles, total number of loaded vehicles, total number of vehicles to carry the same load, 80-kN single-axle-load equivalencies for front axles per 100 vehicles, and 80-kN single-axle-load equivalencies for nonfront axles per 100 vehicles for rigid and flexible pavements. Single-axle-load equivalencies, total payload per 100 vehicles, total number of loaded vehicles, and total number of vehicles at future limits are based on truck weight data supplied by federal and state highway agencies.

The highways were classified into three categories:

Table 2. Truck fleet mix by percentage of commodity tonnage transported.

Commodity Number	Commodity	Tonnage by Truck Type (%) 3-S2	Twin 8-m Trailers	Twin 12-m Trailers	Triple 8-m Trailers
	Agricultural goods				
1	Nonrefrigerated	83		17	
2	Refrigerated	58		42	
3	Forest products	58		42	
4	Bulk extractive resources	100		0	
5	Fuels, oils, and chemicals	45		55	
6	Building materials	50		50	
7	Textiles and textile products		30	55	15
8	Pulp, paper, and printed material		20	70	10
9	Furniture and household goods		5	90	5
10	Transportation equipment		0	0	0
	Manufactured goods				
11	Light		35	56	20
12	Medium	27		73	
13	Heavy	20		80	
14	General freight		50	25	25

Note: 1 m = 3.3 ft.

Table 3. Average payload by commodity and region.

Commodity Number	Average Payload (t) by Region: National	West	Midwest	Southwest	East
1	15.06	16.62	15.17	14.40	13.97
2	15.64	16.74	15.89	14.65	14.62
3	14.32	16.47	12.83	14.27	13.50
4	18.99	19.49	18.87	18.71	19.68
5	15.44	16.12	16.29	15.95	14.66
6	15.36	16.69	15.50	15.79	15.32
7	10.22	9.35	10.62	10.86	9.62
8	11.40	13.53	11.07	12.32	9.52
9	6.54	7.57	6.15	6.75	7.54
10	11.00	9.57	11.75	10.50	9.72
11	13.32	13.41	13.38	14.11	12.82
12	10.08	11.31	9.78	10.59	10.52
13	15.32	14.91	15.74	14.53	15.37
14	10.77	12.08	11.04	11.22	10.40

Note: 1 t = 1.1 tons.

Interstate highways, farm-to-market roads, and other main roads (including U.S. highways and state highways). A uniform terminal serviceability index, slab thickness for rigid pavement, and structural number for flexible pavement were assumed for each class of highways.

Six types of vehicles were selected for evaluation because of their importance in the traffic stream. Figure 1 shows the four types of vehicles evaluated for scenarios A and B. These four vehicles are included in the six vehicles evaluated in scenarios C and D, shown in Figure 2.

The model for fuel consumption that was selected from a review of the literature (5-9) relates fuel consumption to GVW. The assumption for 80-kN single-axle-load equivalencies is based on formulas of the American Association of State Highway and Transportation Officials (10).

To calculate benefits and costs under various scenarios, the distribution of vehicle weights must be properly reflected. However, since only the weight data under pre-1975 limits were available when the project started, there was a need to shift the present weight distribution to obtain a most likely weight distribution under the future limits. As more data were gathered and analyzed, the NCHRP Report 141 shifting procedure was found to be inaccurate. Modifications were made, and an improved version—referred to as the SDHPT shifting procedure—was instituted. This procedure is discussed in detail elsewhere (2).

A truck-fleet-mix forecast was needed for each of the four scenarios. For scenarios A and B, a forecast based on historical trends was used for all four vehicles currently allowed on Texas highways. In making the truck-fleet-mix forecast, which was an extrapolation of historical trends, guidance was obtained from experience in other states, possible commodity shifts, and highway class. Based on this forecast and the average payload obtained from the TRUCKY program, ton-kilometer estimates were assigned to each vehicle type for the next 20 years.

For scenarios C and D, a procedure was developed to make possible a feasible forecast because there were no statewide historical trends for the 3-S2-4 and 2-S1-2-2 truck types. The procedure devised consisted of several assumptions that required sensitivity testing.

First, a commodity-specific forecast was made. All commodities were classified into 14 categories, as in the Hansen Associates study (3). Based on the characteristics of the commodity, a percentage of the total tonnage carried was assigned to each of the four types of vehicles (see Table 2). Commodities 1-6, 12, and 13 are high-density commodities and thus are assigned to truck types 3-S2 and 3-S2-4, both of which are suitable for high-density commodities. Commodities 7-11 and 14 are of lighter density and so are assigned to truck types 2-S1-2, 3-S2-4, and 2-S1-2-2, all of which are suitable for bulky commodities.

No switch in ton-kilometer estimates for types 2D and 3A to larger vehicles was assumed for scenarios C and D. It is possible that, because of the unique characteristics of the commodities carried by these two types of vehicles, there could be a significant switch, but lack of pertinent data restricted the analysis to the use of the "no-switching" assumption.

Since the ton-kilometer estimates assigned to types 2D and 3A are assumed to be the same, only the estimates assigned to types 3-S2 and 2-S1-2 were redistributed in scenarios C and D to the four larger vehicles.

The number of truck ton kilometers assigned to each highway class system in the state is based on a projection through the year 1997 (2). Of intercity truck ton kilometers, 47 percent is assigned to Interstate highways, 45 percent to other state highways, and 8 percent to farm-to-market roads. For each highway system, each commodity is assumed to control a certain share of the fixed amount of ton kilometers. This percentage is based on commodity data contained in the recent Hansen Associates study (3). Table 3 gives average truck tonnage by commodity and region, and Table 4 gives the percentage distribution of truck kilometers by commodity and region. The product of truck tonnage and truck kilometers yields estimated truck ton kilometers for each commodity in four regions in the southwest region of the United States. Because of the lack of commodity information for Texas and the nature of economic activities in the various regions of the state, the average of four multistate regions was used to represent a possible Texas situation. From these assumptions, a forecast of truck ton kilometers by highway class was estimated.

Since the trucking industry would not be able to convert instantaneously to the larger truck combinations, a 14-year transition period for full implementation was used for scenarios B, C, and D. Ninety percent of the affected freight-haul demand would be free to use the larger or heavier trucks in the first 8 years. The remaining 10 percent by assumption could use the system by the end of the 14 years (2).

The results obtained from the TRUCKY program and forecasts of ton-kilometer distribution were used to compute the 80-kN single-axle load for rigid and flexible pavements, truck operating cost, and fuel consumption for the 20-year analysis period.

Table 4. Distribution of truck kilometers by commodity and region.

Commodity Number	Percentage of Interstate Truck Kilometers by Region			
	West	Midwest	Southeast	East
1	19.95	17.83	15.82	12.93
2	9.87	5.95	7.01	3.94
3	4.17	1.26	3.35	0.74
4	0.17	0.72	0.95	0.95
5	12.04	7.09	10.06	10.67
6	2.10	2.22	2.10	4.91
7	1.83	1.28	6.28	1.71
8	4.07	4.98	5.68	6.23
9	0.63	0.74	0.85	0.57
10	1.26	1.94	1.35	1.30
11	4.53	5.08	6.44	8.32
12	5.25	6.34	4.63	5.37
13	7.38	17.41	8.65	15.15
14	26.76	27.15	26.83	27.19

Table 5. Comparative 20-year costs for four scenarios.

Scenario	Cost Item	Cost (millions constant 1977 dollars)			
		Interstate Highways	Farm-to-Market Roads	Other State Highways	Total State System
A	Pavement maintenance and seal coats	240	1100	960	2 300
	Pavement rehabilitation	1334	1512	3084	5 930
	Bridge replacements	4	76	50	130
Total		1578	2688	4094	8 360
B	Pavement maintenance and seal coats	240	1100	960	2 300
	Pavement rehabilitation	1888	1953	4618	8 459
	Bridge replacements	172	376	554	1 102
Total		2300	3429	6132	11 861
C	Pavement maintenance and seal coats	240	1100	960	2 300
	Pavement rehabilitation	1426	1524	3178	6 128
	Bridge replacements	4	79	52	135
Total		1670	2703	4190	8 563
D	Pavement maintenance and seal coats	240	1100	960	2 300
	Pavement rehabilitation	1595	1590	3485	6 670
	Bridge replacements	46	152	264	462
Total		1881	2842	4709	9 432

Table 6. Comparison of inputs to REHAB.

Type of Highway	Type of Pavement	80-kN Equivalent Axle Loads per 20 Years by Scenario				Ratio of Pavement Life with Respect to Scenario A		
		A	B	C	D	A/B	A/C	A/D
Interstates	Flexible	7 813 000	12 980 000	8 558 000	9 919 000	0.602	0.913	0.788
	Rigid	11 720 000	20 250 000	12 033 000	14 413 000	0.579	0.974	0.813
Farm-to-market roads	Flexible	92 800	194 800	94 300	101 800	0.476	0.984	0.912
	Rigid	141 100	278 800	134 000	149 000	0.506	1.053	0.967
Other state highways	Flexible	871 700	1 602 000	877 000	989 000	0.544	0.993	0.881
	Rigid	1 308 000	2 435 000	1 227 000	1 422 000	0.537	1.066	0.920

Note: 1 kN = 224.8 lbf.

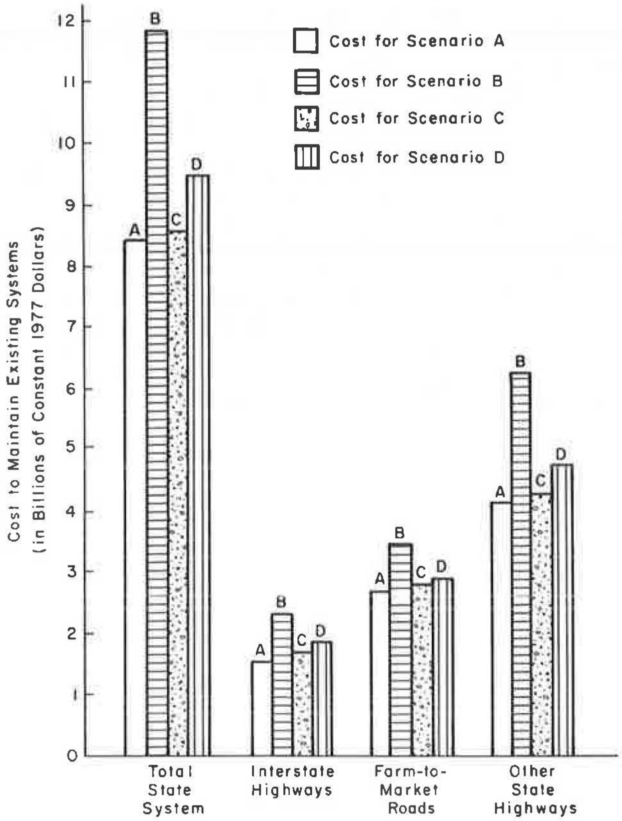
Table 7. Comparison by ratio of highway costs, savings in truck operating costs, and fuel savings among scenarios for 20-year period.

Category	Total Highway Systems			Interstate Highways			Farm-to-Market Roads			Other State Highways			County Roads and City Streets
	B/A	C/A	D/A	B/A	C/A	D/A	B/A	C/A	D/A	B/A	C/A	D/A	
Additional highway cost (billions of constant 1977 dollars)	3.50	0.20	1.07	0.72	0.09	0.30	0.74	0.02	0.15	2.04	0.10	0.62	Unknown
Savings in truck operating costs (billions of constant 1977 dollars)	9.12	11.09	12.65	4.57	6.63	7.40	0.71	0.50	0.59	3.84	3.96	4.65	Unknown
Fuel savings[a] (millions of cubic meters)	9.16	11.29	13.24	4.62	6.72	7.75	0.69	0.53	0.61	3.93	4.05	4.89	Unknown

Note: 1 m^3 = 6.28 bbl.

[a] Fuel cost savings are included in truck operating costs.

Figure 3. Twenty-year cost (1977-1997) to maintain existing highway system, excluding city streets and county roads.



FINDINGS

The 20-year costs for all four scenarios are summarized in Table 5, where they are defined by highway class and expense item. For comparison, the impact of scenario C on highway pavements and bridge replacements is only marginally higher than the impact of costs anticipated under current laws governing truck sizes and weights in Texas (scenario A). As expected, scenario B would be the most expensive scenario in the long run. It is important to note that the cost of bridge replacements includes only the estimated cost of upgrading bridges to carry the loads included in the scenarios. The costs of structure maintenance, bridge replacement, and rehabilitation attributable to functional deficiencies and wear-out are not included because of the inability to isolate structural maintenance requirements associated with heavy loads and the lack of current technology for analyzing the effects of repetitive heavy loadings on the life of structures. The totals, therefore, do not reflect the entire cost of maintaining the existing system.

As a basic element in the computation of some of the pavement-related costs in the preceding, the findings of the AASHO Road Test were integrated into a computer program called REHAB to compute the 80-kN equivalent axle loads over a 20-year period by highway class and by type of pavement (flexible or rigid) for each scenario (see Table 6). It is interesting to note that, in the comparison of scenarios A and C, the results indicate that scenario C compares favorably. Scenario B is the most detrimental case in terms of equivalent axle loadings. When the results of the output on pavement and bridge impacts are compared, scenario C, as projected over the next 20 years, is not much different from the existing situation.

As the next step in the analysis, the scenarios were compared on the basis of operating costs, including fuel consumption. Table 7 gives a summary of the differential operating costs, in 1977 dollars, over 20 years by highway class and scenario. For the most part there is no significant difference in the ratio of operating costs for scenarios B, C, or D with respect to scenario A. Obviously, all were found to provide savings over the existing situation (scenario A). In terms of fuel consumption (Table 7), similar observations and findings are suggested. For another perspective, Figure 3 shows the estimated costs of perpetuating the existing system, in billions of constant 1977 dollars, over the 1977-1997 period. These costs exclude consideration of county roads and city streets.

CONCLUSIONS AND RECOMMENDATIONS

The analysis described in this paper suggests that, based on the cost increases for pavements and bridges alone, scenario C should be allowed. It is important to note that the pavement and bridge effects do not represent the complete set of impacts associated with each scenario. To complete the direct costs of each alternative scenario, an investigation has been initiated to develop costs associated with geometric design requirements and public safety.

Although quantitative estimates of these effects are not yet complete, the results of other studies suggest the importance of several safety-related aspects in an overall evaluation of large vehicles in the traffic stream. These include, but are not limited to, such elements as passing maneuvers, splash and spray, braking and stopping characteristics, vehicle maneuverability, and increased truck widths. In addition, quantifiable estimates of the effect of larger trucks on accidents, accident rates, and accident severity are needed.

In dollar terms, the most important effects of longer and wider trucks will likely result from the need to improve the geometric design features of the affected highway network. Substantial costs will be incurred to widen lanes, improve shoulders, alter passing lanes, adjust turning radii, and so on. Concepts such as marshalling yards, truck routes, load zoning, deregulation, law enforcement, small automobiles, and effects on city streets and county roads must be investigated. Estimates of these and other improvement costs are clearly needed before an informed judgment can be made about the efficiency of large vehicles.

REFERENCES

1. R. E. Whiteside and others. Changes in Legal Vehicle Weights and Dimensions. NCHRP, Rept. 141, 1973.
2. J. Brown and others. Effect of Heavy Trucks on Texas Highways. Texas State Department of Highways and Public Transportation, Austin, 1978.
3. Hansen Associates. State Laws and Regulations on Truck Size, Weight, and Speed. NCHRP, draft rept., 1978.
4. S. Cohen and C. Holcomb. Assessment of the Effects of Increased Truck Size and Weight Limits on Shippers and States. Intermodal Studies Division, Office of the Secretary of Transportation, U.S. Department of Transportation, 1979.
5. W. L. Hall. Financing Modern Highways for Montana. Montana Fact-Finding Committee on Highways, Streets, and Bridges, Helena, 1956.
6. M. F. Kent. Fuel and Time Consumption Rates

for Trucks in Freight Service. HRB, Bull. 276, 1960.
7. Line-Haul Trucking Cost in Relation to Vehicle Gross Weights. HRB, Bull. 301, 1961.
8. Supplementary Report of the Highway Cost Allocation Study. 89th Congress, 1st Session, U.S. Government Printing Office, House Doc. 124, 1965.
9. E. K. Bender and M. C. Kaye. Truck Noise III-g: Field Test of Freightliner Girded Truck. U.S. Department of Transportation, Sept. 1975.
10. Interim Guide for Design of Pavement Structures. AASHTO, Washington, DC, 1974.

Publication of this paper sponsored by Task Force on Motor Vehicle Size and Weight.

Improving the Effectiveness of a Citizens' Regional Transportation Committee

Peter M. Lima

The roles performed by the citizens' regional transportation committee that operates in the Omaha-Council Bluffs metropolitan area, a major midwestern region located in the states of Nebraska and Iowa, are discussed. This committee participates in four primary roles: (a) advisory, (b) advocacy, (c) review and comment, and (d) participatory planning. Specific examples of each role are presented, and each role is then analyzed for its effectiveness in resolving transportation issues. In general, the review-and-comment and advocacy roles have been the most effective among the four roles because they encourage participation and are oriented toward project issues. Recommendations are made on how to improve the effectiveness of these two roles. The recommendations are directed primarily toward the project-implementation stage rather than the earlier stages of the planning process. Recommendations are also made to further improve the effectiveness of a regional citizens' committee by breaking down the transportation system into corridors or subareas. This step would help to encourage citizen participation earlier in the process by focusing on local as well as regional issues.

The purpose of this paper is to present observations and perceptions of a citizens' regional transportation committee and to suggest improvements to the advisory process followed by this type of committee. Since I am chairman of the committee in question, the viewpoint expressed here is that of the private citizen rather than the professional planner. The committee discussed here is one working committee among several in a formal citizens' advisory board of the Omaha-Council Bluffs Metropolitan Area Planning Agency (MAPA). The advisory board, which is the central focus of the planning agency's ongoing citizen-participation program, provides guidance to the agency with regard to comprehensive planning and systems-level transportation planning. One comprehensive analysis of citizen-participation techniques has documented various types of advisory committees and task forces (1). But the operation of an ongoing regional committee cannot be easily categorized; it is complex and involves functions that are not restricted to giving advice on the long-range planning process. Rather, the committee members may participate in A-95 review or may become advocate planners for a certain project. These different roles then contribute in varying degrees to the effectiveness of the participation program in resolving transportation issues.

It is the intent of this paper to discuss how these roles can be used to the best advantage to improve the overall effectiveness of such an ongoing committee. In this regard, the following sections of this paper present descriptions of the Omaha-Council Bluffs metropolitan area, the regional transportation planning process, and the citizens' transportation committee. The paper then presents observations and perceptions of this transportation committee and offers suggestions for improving the effectiveness of regional committees.

DESCRIPTION OF METROPOLITAN REGION

The Omaha-Council Bluffs standard metropolitan statistical area (SMSA) (see Figures 1 and 2) is composed of Douglas and Sarpy Counties, Nebraska, and Pottawattamie County, Iowa, and includes more than 20 incorporated cities, towns, and villages. Among these municipalities, the three most important are the cities of Omaha and Bellevue in Nebraska and Council Bluffs in Iowa. The Missouri River, a primary inland waterway, divides the region into the Nebraska and Iowa portions, and the Platte River borders the southwestern portion of the region. Within the SMSA, the physical terrain is a gently rolling landscape with only a few natural barriers to urban development, the most prominent of which are the floodplains of the Missouri and Platte Rivers and the wind-deposited loess hills on the east bank of the Missouri River.

As a result of limited physical restrictions on growth and intense agricultural activity, the Omaha-Council Bluffs SMSA grew in population from 100 000 inhabitants in 1870 to more than 600 000 by 1976. Historically, urban growth concentrated in the city of Omaha, which currently accounts for more than 60 percent of the total SMSA population. More recently, the pattern of growth has shifted to the southwestern portion of the region and is primarily concentrated in the city of Bellevue and in Sarpy County. Although the Omaha-Council Bluffs area has undergone significant urban development, the amount of developed land accounts for only 10 percent of the total land area. Hence, the SMSA remains oriented toward agriculture, which continues to be the economic mainstay of the region. Since 1950, however, agriculturally oriented employment has declined, and employment in the trades and services has grown.

Although the central business districts (CBDs) of Omaha and Council Bluffs constitute the traditional urban core, the metropolitan region has undergone intensive decentralization over the past decade. In general, urban development has sprawled outward,