

# Passenger Car Dimensions as Related to Parking Space

## I. Vehicle Data

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The author presents data showing trends in car sizes—lengths, widths and heights—during the past three decades. Figures are presented principally as yearly averages for the industry but, in addition, maximum and minimum values for each year are shown and some comparative data are supplied on low and medium-low priced cars in highest production volume.

Lengths and widths remained relatively constant only in the period from 1946 to 1954. The figures indicate significant increases in both lengths and widths of cars in the last four years. The rates of growths of these two car dimensions approximate the corresponding increase in the pre-war years.

Car heights have shown a decrease throughout the 30-year period, with the post-war changes continuing the pre-war trend. Heights remained relatively static only in the period from 1934 to 1938.

● THIS REPORT presents a study of trends in car sizes—lengths, widths, and heights—for the 32 years from 1927 to 1958.

Car sizes are of particular significance in connection with modern automobile usage—particularly in terms of traffic congestion, and design of parking facilities and highways.

Casual observations indicate that today's cars are larger, wider and lower than those of previous years. It is the intent of this paper to establish statistically, for reference purposes, the magnitude and timing of such changes. The trends in lengths, widths and heights are indicated on the charts herewith. An analysis of the trends follows.

### ANALYSIS OF TRENDS

#### Length

1. Average lengths of passenger cars have increased about 4.5 in. during the past four years.

2. Significant increases in car lengths also are shown for the three makes of automobiles which represent 54 to 59 percent of the total production during this period. For these three the average length of new cars has increased nearly 12 in. since 1954 and is rapidly approaching the industry-average value.

3. Maximum and minimum lengths of new cars have shown no major change during the entire post-war period. These maximum and minimum values represent cars generally in rather limited production.

4. The early post-war period (1946-1954) evidenced no significant trend toward longer cars—trend curves are relatively flat.

5. Pre-war cars showed a major increase in length, particularly in the 1931-1937 period. These increased lengths resulted from several evolutions in car design, such as built-in trunks (affecting rear overhang) and the forward shift of both the engine and passenger areas (affecting front overhang). The trunk luggage space was provided to satisfy public demand for convenience; the relocation of passenger areas has important engineering implications in terms of ride and stability.

6. It is interesting to note that the Ford Model T of 1927 measured only 137 in.

TABLE 1  
LENGTH

Year	Minimum		Averages		
			F-C-P <sup>a</sup>	Industry	Maximum
1927	137	Ford "T"	147.3	165.5 (17) <sup>b</sup>	190.3 Hudson <sup>c</sup>
1928	152.5	Ford <sup>c</sup>	159.2	169.7 (14)	213.8 Cadillac
1929	138	Ford	153.7	171.7 (19)	212 Cadillac
1930	140	Ford	152.7	169.3 (18)	205 Cadillac
1931	143	Ford	153.3	168.2 (19)	194.8 Cadillac <sup>c</sup>
1932	154.5	Ford	158.8	174.1 (21)	210 Cadillac
1933	168.4	Essex	173.1	187.4 (17)	213.6 Cadillac
1934	170.6	Chevrolet	174.8	193.2 (19)	215.4 Cadillac
1935	171	Chevrolet	181.9	193.4 (22)	209.7 Studebaker
1936	186.8	Ford	188.1	197.6 (22)	213.6 Cadillac
1937	180.5	Ford	189.6	198.8 (27)	216.3 Packard
1938	184.8	Chevrolet	189.1	199.1 (27)	220.4 Cadillac
1939	185.8	Studebaker	189.6	199.1 (30)	225.5 Cadillac
1940	187.1	Studebaker	192.7	201.6 (30)	226.9 Cadillac
1941	190	Studebaker	196.1	204.8 (30)	225.8 Cadillac
1942	193.6	Studebaker	196.0	207.0 (24)	225.9 Cadillac
1943-1944-1945 World War II					
1946	194.7	Plymouth <sup>c</sup>	196.9	206.8 (16)	218.8 Lincoln
1947	191.5	Studebaker	197.0	208.1 (18)	223.8 Cadillac
1948	191.3	Studebaker	196.8	207.2 (26)	225.6 Cadillac
1949	191.5	Plymouth	195.1	206.1 (26)	226.8 Cadillac
1950	192.6	Plymouth	195.6	206.4 (29)	224.9 Cadillac
1951	193.8	Plymouth	196.3	206.8 (31)	224.5 Cadillac
1952	187.8	Ford	193.2	206.5 (30)	224.5 Cadillac
1953	189.2	Plymouth	194.2	206.4 (30)	224.8 Cadillac
1954	186.2	Rambler	196	207.7 (33)	227.4 Cadillac
1955	186.2	Rambler	199.3	208.8 (41)	227.3 Cadillac
1956	191.14	Rambler	200.3	209.0 (40)	229.6 Imperial
1957	191.14	Rambler	203.6	210.1 (33)	224.7 Lincoln
1958	191.15	Rambler	207.8	212.2 (33)	229.0 Lincoln

<sup>a</sup> Ford-Chevrolet-Plymouth.

<sup>b</sup> Figures in parentheses indicate number of cars or models used to obtain average.

<sup>c</sup> These values may not be minimum or maximum of industry in that year, due to limited number of cars obtained for measurement and comparisons.

over-all. The Ford Fairlane of 1958 measures 207 in.—an increase of 70 in., or nearly 6 ft.

### Width

1. Widths of new cars have increased materially in the last two years—evidenced by the marked increases in industry averages. The three big-volume cars have been widened about 3.4 in. in the past two years, and now for the first time are very close to the industry average. Since 1954 the industry-average width has increased 2.2 in.

2. The greatest increase in width occurred in pre-war cars—about 8-in. increase in the new-car industry average from 1927 to 1942. This increase was associated with the adoption of wider seats to accommodate three persons side-by-side, instead of two as in the 1920's. However, part of the increased passenger capacity was provided by widening the car body to full car width, eliminating exterior running boards, as discussed later.

Height

1. Heights have shown consistent decreases both in pre-war and post-war cars as the industry developed cars with lower appearance and lower center of gravity. The

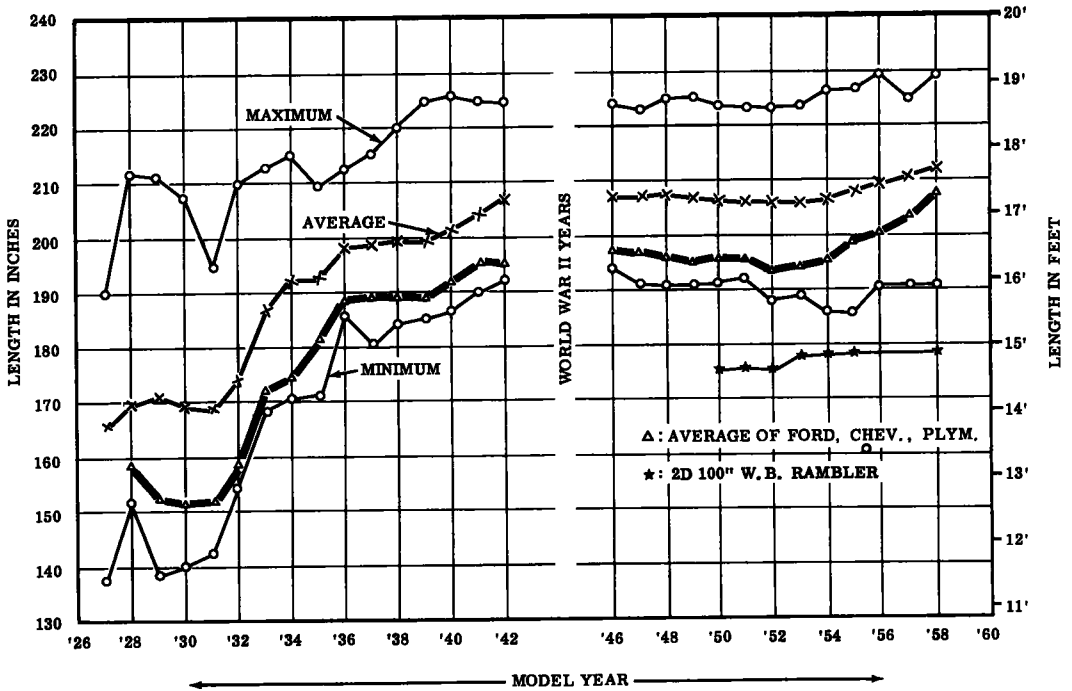


Figure 1. Over-all length of 5 to 6 passenger, 4-door sedans.

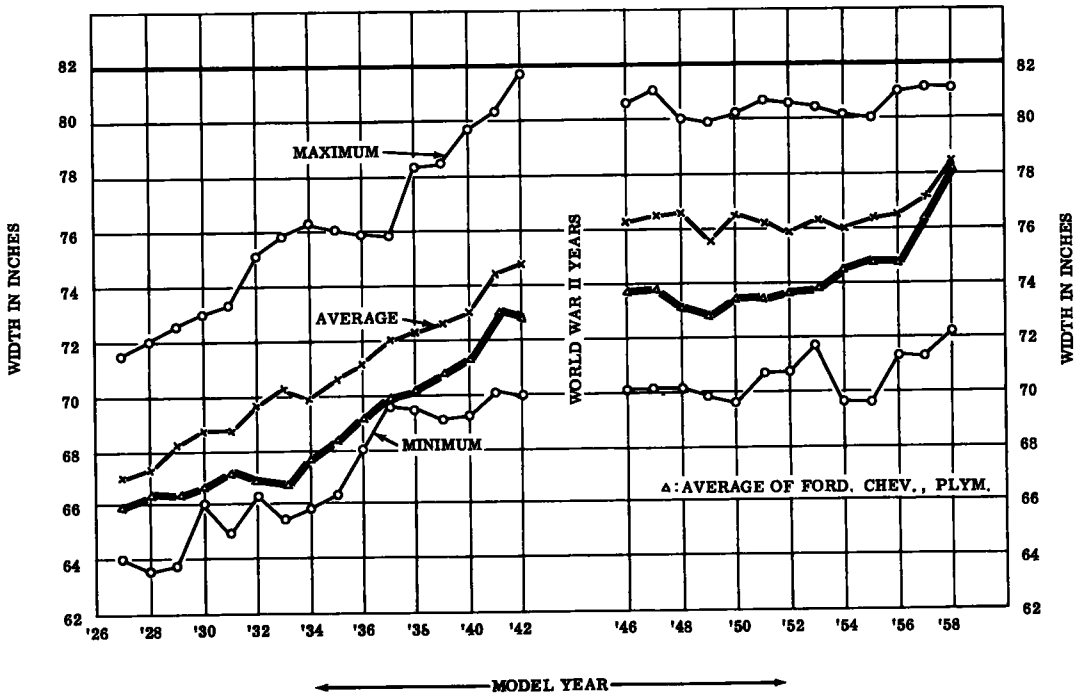


Figure 2. Over-all width of 5 to 6 passenger, 4-door sedans (doors closed).

TABLE 2  
WIDTH

Year	Minimum	Averages		
		F-C-P <sup>a</sup>	Industry	Maximum
1927	64 Essex	65.87	67.0 (16) <sup>b</sup>	71.5 Lincoln
1928	63.5 Essex	66.5	67.3 (13)	72 Cadillac
1929	63.8 Essex	66.37	68.2 (19)	72.5 Hudson
1930	66.0 Essex	66.63	68.7 (18)	73 Cadillac
1931	65 Essex	67.13	68.7 (18)	73.3 Cadillac
1932	66.3 DeSoto	66.83	69.6 (21)	75.1 Cadillac
1933	65.4 Chevrolet	66.77	70.3 (17)	75.9 Cadillac
1934	65.8 Chrysler	67.63	69.9 (19)	76.3 Cadillac
1935	66.3 Chevrolet	68.37	70.7 (22)	76.0 Cadillac
1936	68 Chrysler	69.1	71.1 (22)	75.9 Cadillac
1937	69.5 Ford	69.73	72.0 (27)	75.8 Cadillac
1938	69.4 Ford	70.07	72.3 (27)	78.4 Cadillac
1939	69.1 Studebaker	70.73	72.7 (30)	78.5 Cadillac
1940	69.2 Studebaker	71.27	73.0 (30)	79.7 Cadillac
1941	70.1 Studebaker	73.0	74.4 (30)	80.6 Cadillac
1942	70 Studebaker	72.7	74.7 (24)	81.8 Cadillac
1943-1944-1945 World War II				
1946	70.3 Studebaker	73.53	76.2 (16)	80.7 Cadillac
1947	70.3 Studebaker	73.75	76.3 (18)	81.2 Cadillac
1948	70.2 Studebaker	73.12	76.4 (26)	80.0 Cadillac
1949	69.8 Studebaker	72.83	75.6 (26)	79.9 Cadillac
1950	69.6 Studebaker	73.4	76.4 (29)	80.1 Cadillac
1951	70.7 Studebaker	73.4	76.2 (30)	80.7 Oldsmobile
1952	70.7 Studebaker	73.9	75.9 (30)	80.6 Cadillac
1953	71.7 Studebaker	73.57	76.2 (30)	80.5 Cadillac
1954	69.5 Studebaker	74.47	76.2 (33)	80.1 Cadillac
1955	69.5 Studebaker	74.73	76.6 (41)	80.0 Buick
1956	71.3 Rambler	74.93	76.7 (40)	81.0 Chrysler
1957	71.3 Rambler	76.37	77.1 (32)	81.2 Imperial
1958	72.2 Rambler	78.32	78.4 (33)	81.2 Imperial

<sup>a</sup> Ford-Chevrolet-Plymouth.

<sup>b</sup> Figures in parenthesis indicate number of cars or models used to obtain average.

highest cars now in production are considerably lower than the lowest of only 5 years ago.

Car heights have only incidental effects on parking considerations. For this reason the changes in heights are mentioned here primarily as a matter of interest. Vehicle heights have other important effects, however, such as safety, stability, and ease of handling.

#### SOURCE OF DATA

Data in this paper on car lengths, widths and heights for pre-war new cars (1927 to 1942) were obtained from actual engineering measurements made on sedans by one of the automobile manufacturers, on its own and competitive cars purchased for tests and comparisons. In most years, sufficient cars were purchased and measured to represent a comprehensive coverage of the industry in those years. A few two-door sedans were included for the early years of this study, but otherwise the cars were of the four-door, five- or six-passenger variety. No foreign-built cars were included.

Car makes and models were selected to provide a reasonable continuity for statis-

tical purposes, as will be discussed later. Post-war cars were selected to include all makes and major series produced in 1956-1957-1958. A total of 51 makes and models resulted. A relatively few makes were eliminated—Kaiser, Frazer, Henry J, Hudson Jet, the 100-in. Rambler, Willys Aero, Crosley. (Some of these makes or models were not "qualified" as they were not available in four-door sedan models.)

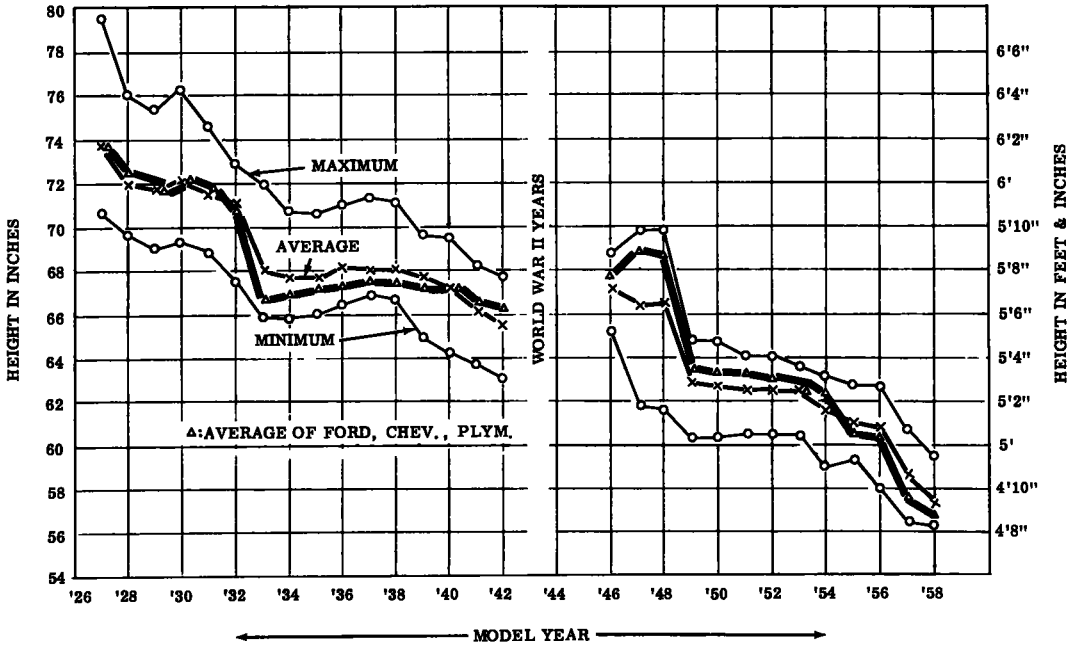


Figure 3. Over-all car height of 4-door sedans loaded with 5 passengers.

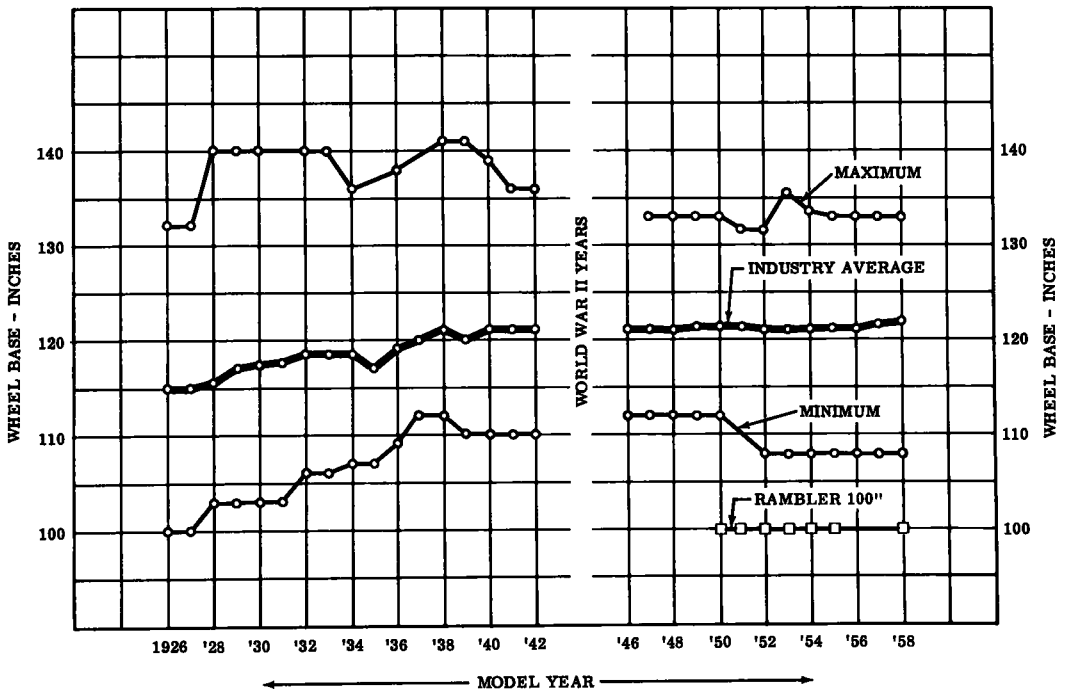


Figure 4. Wheelbase of 5 to 6 passenger, 4-door sedans.

TABLE 3  
HEIGHT

Year	Minimum	Averages		
		F-C-P <sup>a</sup>	Industry	Maximum
1927	70.6 Nash	73.8	73.7 (16) <sup>b</sup>	79.4 Buick
1928	69.5 Dodge	72.4	72.0 (14)	76 Cadillac
1929	69 Chrysler	71.9	71.9 (19)	75.3 Cadillac
1930	69.4 Buick	72.13	72.1 (18)	76.3 Cadillac
1931	68.9 Dodge	71.87	71.5 (19)	74.6 Cadillac
1932	67.6 Hudson	70.37	71.1 (21)	73 Cadillac
1933	65.9 Chevrolet	66.57	68.0 (17)	72 Cadillac
1934	65.8 Chev. & DeSoto	66.83	67.7 (19)	70.7 Packard
1935	66.0 Chevrolet	67.2	67.8 (24)	70.6 Packard
1936	66.4 Lincoln	67.3	68.1 (24)	71 Packard
1937	66.8 Studebaker	67.63	68.0 (27)	71.4 Packard
1938	66.7 Studebaker	67.37	68.0 (27)	71.3 Packard
1939	65 Studebaker	67.4	67.7 (30)	69.7 Cadillac
1940	64.2 Studebaker	67.07	67.1 (30)	69.6 Nash
1941	63.8 Cadillac	66.77	66.1 (31)	68.1 Cadillac
1942	63.1 Oldsmobile	66.3	65.6 (25)	67.7 Nash
1943-1944-1945 World War II				
1946	65.3 Buick	67.8	67.3 (16)	68.8 Mercury
1947	61.8 Studebaker	69.0	66.4 (18)	69.9 Ford
1948	61.7 Hudson	68.9	66.5 (26)	69.9 Ford
1949	60.2 Hudson	63.33	62.8 (26)	64.7 Packard
1950	60.2 Hudson	63.3	62.7 (29)	64.7 Packard
1951	60.4 Hudson	63.3	62.6 (31)	64.0 Chrysler
1952	60.4 Hudson	63.0	62.6 (30)	64.0 Chrysler
1953	60.4 Hudson	62.37	62.4 (30)	63.5 Oldsmobile
1954	59.0 Rambler	62.37	61.7 (33)	63.2 Pontiac
1955	59.4 Rambler	60.53	61.1 (41)	62.7 Lincoln
1956	58.0 Rambler	60.33	60.9 (41)	62.7 Buick
1957	56.2 Ford	57.48	58.4 (33)	60.4 Nash
1958	56.22 Ford	56.78	57.38 (33)	59.6 Buick

<sup>a</sup> Ford-Chevrolet-Plymouth.

<sup>b</sup> Figures in parenthesis indicate number of cars or models used to obtain average.

Fortunately these post-war makes also represented the popular cars in medium-to-high production for the entire 32-year period, with relatively few exceptions.

Makes and typical series of new cars for the post-war years included:

Buick 40-50-60-70	Lincoln
Cadillac 61-62-60S	Mercury
Chevrolet 6 and V8	Nash 600, States., Amb. 6 and V8
Chrysler W., N. Y., Imp.	Oldsmobile 66, 68, 88, S88, 98
DeSoto 6, Str. 8, V8	Packard 200, 300, 400, Clipper, Patrician
Dodge 6 and V8	Plymouth 6 and V8
Ford 6 and V8	Pontiac 6, Str. 8, V8
Hudson Comm., Hornet, Wasp, V8's	Rambler 6 and V8
Studebaker Champ., Comm., Pres., L.C.	

Models and/or series of each make were chosen to provide continuity and resulting statistical significance. (Such continuity was considered necessary for the data to be statistically significant in providing valid and comparable industry averages.) For ex-

ample, the same number of dimensions were used for consecutive years wherever data were available, even though dimensions in any one year might happen to be the same for every model of a given make.

For the pre-war years the same domestic makes were included, but some of the model and series names were different, representing the normal evolution characteristic of the industry. Pre-war (1927-1942) models totaled 31 and included the following:

Buick Std. , 40, 50, Roadmaster	LaSalle Str. 8, V8 (by Cadillac)
Cadillac 60, 61, 70	Lincoln, Zephyr, V12
Chevrolet 4 and 6	Mercury (since 1938)
Chrysler 6, Str. 8, N. Y.	Nash Spec. 6, Adv. 6, Amb. 6, 600
DeSoto	Oldsmobile 6, Str. 8's, 66, 68, 78, 88
Dodge	Packard 110, 120, Super 8, Custom 8
Essex, Terraplane (by Hudson)	Plymouth 4 and 6
Ford T, A, B, 60, 85, 6, V8	Pontiac 6 and 8
Hudson Super 6, Commodore	Studebaker Ch. , Comm. , Pres. , Land Cr.

Many more pre-war makes were produced and sold than are listed above. However, makes produced in the 20's and 30's but later discontinued were purposely omitted, to avoid possibility of interference with the continuity of models considered necessary for best statistical procedures. Such makes not included in the dimensional study include the following:

Durant	Jordan	Hupmobile	Graham-Paige
Flint	Franklin	Locomobile	Jewett
Star	Stutz	Rickenbacker	Reo
Willys Knight	Marmon	Pierce-Arrow	Gardner
Whippet	Moon	Peerless	Chandler

Most of these makes were casualties of the depression years in the 1930's. These discontinued makes generally represent cars in relatively low production volume. If included they might erroneously affect the validity of the industry averages.

In the 1952-1958 period, opportunity was offered for comparing the previously described new-car industry averages with two independent compilations of yearly averages using (a) all cars in production of the four-door six-passenger sedan types, and (b) the eight domestic makes in highest production volume during the 1938-1958 period, and representing over 80 percent of the total production in that period.<sup>1</sup> The dimensional trends were substantially the same for all three methods. It was apparent that the statistics using the post-war 51 "continuing" makes and models produced acceptable results for the purpose of this paper.

In each year certain long-wheelbase, low-production, specialized types of passenger vehicles were eliminated from the tables. Such vehicles included the seven- and eight-passenger sedans and limousines such as offered in the Cadillac 75, the larger Packards and the Chrysler Imperial. It was considered that these specialized cars would unduly affect the maximum values for each year, as well as the average.

Data for each year are herein reported as:

1. The range of sizes offered (represented by the maximum and minimum values).
2. The arithmetic average of the individual values for each year, giving each make and/or model equal weight.<sup>2</sup>
3. The average of Ford-Chevrolet-Plymouth sedans, to give an idea of the largest proportion of car production. This Ford-Chevrolet-Plymouth average was used in lieu of the complex mathematical procedures needed if exact "weighting" were given to

<sup>1</sup>The independent 1952-1958 industry averages, and the 8-car 1938-1958 averages are not reported in this paper.

<sup>2</sup>A few exceptions to comprehensive industry coverage are apparent in the charts, but generally they affect the minimum and maximum values rather than the averages. Specific examples include the maximum lengths noted in 1927 and 1931—larger cars were in production in both of these years.

relative production of each make and model. Such an involved statistical procedure was considered prohibitive as to research time requirements, and unnecessary for the purpose of this paper.

4. Wheelbase trends for the years 1930-1958 are shown in Figure 4, as a matter of general interest. It will be noted that, unlike over-all length, wheelbases remained relatively constant throughout this period.

While interpreting the yearly dimensions presented herein, it should be noted that there is a considerable delay before any change in the industry-wide yearly values materially affects the majority of cars in actual service. At any one time there are on the roads, not only cars of the current models, but also cars one, two, three, four, and more years of age. The average car in service is 5.5 years old. In the replacement cycle, new cars are supplanting cars 10 to 20 years old as these early vehicles reach the end of their serviceable life.

The significance of this situation is that a trend toward longer, wider or lower cars becomes progressively accentuated, but at a rate slower than that indicated in the charts presented herein. On the other hand, a relatively fast increase in car lengths such as in the last four years, even if arrested or reversed in the 1959 and later models, will become of increased significance to designers of parking facilities in the years to come, as greater numbers of the shorter cars of the 1934 to 1954 model years are retired.

#### GENERAL COMMENTS

Psychological phases importantly affect an observer's concept of car sizes. Although over-all widths increased about 8 in. from 1927 to 1942, bodies and seats increased in width considerably more. Bodies were widened to the over-all car width, running boards were eliminated and doors hung close to the extreme "beam" of the car. The resulting greatly increased over-all width with doors open gave the magnified impression of the car's actual width, particularly as the occupants experience difficulty in entrance and exit in a restricted space, such as in a one-car garage of a 1920 home. Often this problem is accentuated with two-door models which are necessarily equipped with wide doors.

Car styling likewise has a major effect on our conception of exterior dimensions. The "long-look" of modern cars is partly due to the lower lines and reduced over-all height, which changes the relation between height and length. The 1958 Rambler is actually more than an inch narrower over-all than its 100-in. wheelbase predecessor of the 1950-1955 model years—yet it appears considerably wider.

Today, the results of two major automotive forces pulling against each other are apparent. Changes in car usage pull in the direction of more compact, more economical means of personal transportation. On the other hand the established design concepts of the major U. S. producers have tended toward longer, wider, more powerful cars. This traditional design concept is not to be taken lightly—it has been commercially successful; the bigger the new cars got, the more millions were sold.

Size of cars seems to be "going down a dead-end highway." The U. S. car market shows evidence of undergoing a fundamental change. The growing popularity of small, economical foreign cars is one expression of this changing market. The increasing demand for compact, more economical American-built cars is another.

The customer's selection of automobiles—and consequently the length, width and height of the vehicle he drives, parks and garages—might well be an appropriate subject for an entirely separate study in some other field than that of engineering and statistics. The customer today has a wider range of choice, for instance, between the longest and shortest automobile he might purchase. The current interest in smaller more compact cars is of major significance.

#### *Discussion*

WILLIAM F. HALLSTEAD, III, Senior Highway Designer, Whitman, Requardt and Associates, Baltimore—In their symposium presentations at the HRB Convention,



January 8, 1958, both Mr. Stonex and Mr. McConnell placed the responsibility for the "big car" trend on the driving public. Mr. Nagler, whose interest in compact cars is apparent, opposed the trend but did not fire what would have been justified broadsides at his competitors.

George Romney, President of American Motors, is far more outspoken than was his representative at the HRB symposium. He has said: "Cars 19 ft long, weighing two tons, are used to run a 118-lb housewife three blocks to the drugstore for a 2-oz package of bobby pins and lipstick. . . . The automobile industry is noted for its super-salesmanship. It has demonstrated it by selling people on the idea that big, heavy, bulky cars are safer and more comfortable."

Vance Packard, an expert in the analysis of American advertising, has stated that automobile advertising caters to the promotion of "big carism," and resulting "no roomism" in cities. He says that Chrysler's dart shape with its high tailfins is styled primarily as a prestige symbol. Buick designs its cars for "socially mobile people who still aspire to rise higher in social status." According to Packard, many a man buys a new and more powerful car every year or so simply to reassure himself of his own masculinity. This is hardly far-fetched because sales motivation researchers have recently come to the conclusion that a man's automobile is an extension of his personality. Dealers are being warned not to kick the tires of cars brought in for appraisal because the owner may subconsciously take that kick personally.

It appears that automobiles are styled basically for emotional appeal, and that the car manufacturers profit from such an approach. The key words in automobile advertising during the past few years have been "massive" (Mercury); "mightiest muscles" and "most powerful car" (Chrysler); "big," "longer" and "wider" (most manufacturers, but notably Chevrolet in 1958).

The traffic and highway engineers are not overly concerned with the eye-appeal of car styling. Their fundamental interest is its effect. Is the big car trend actually damaging to present vehicle facilities?

The writer recently completed a stop survey of all the major automobile manufacturers, 29 selected traffic departments, the National Parking Association and the American Automobile Association. Replies to this survey were received from about 50 percent of the traffic engineers contacted. Of the 14 automobile manufacturers contacted, only American Motors, Chevrolet, Chrysler and Dodge replied. The National Parking Association was of considerable assistance.

TABLE 4  
COMPARATIVE VEHICLE LENGTHS<sup>a</sup>

Vehicle	1953 <sup>b</sup>	1957	1958	1-Yr Change	5-Yr Change
Buick					
Special Century	206.4	208.4	211.8	+3.4	+5.4
Super Roadmaster Limited	211.2	215.3	219.1	+3.8	+7.9
Cadillac					
Series 60	225.6	224.4	225.3	+0.9	-0.3
Series 62	216.0	215.9	216.8	+0.9	+0.8
Series 75	242.4	236.2	237.1	+0.9	-5.3
Eldorado	-	222.1	223.4	+1.3	-
Chevrolet					
All models	195.6	200.0	209.1	+9.1	+13.5
Chrysler					
Windsor	211.2	219.2	218.1	-1.1	+6.9
Saratoga	-	219.2	220.2	+1.0	-
New Yorker	-	219.2	220.2	+1.0	-
De Soto					
Firesweep	213.6	215.8	216.5	+0.7	+2.9
Fire dome	-	218.0	218.6	+0.6	-
Fireflute	-	-	-	-	-
Dodge					
All models	200.4	212.2	213.8	+1.6	+13.4 & +23.0
Edsel					
Ranger	-	-	213.2	-	-
Pacer	-	-	-	-	-
Corsair	-	-	218.9	-	-
Citation	-	-	-	-	-
Ford					
Custom	198.0	201.7	202.2	+0.5	+4.2
Fairlane	-	201.7	207.2	+5.5	-
Imperial					
All models	-	224.0	225.0	+1.0	-
Lincoln					
All models	213.6	224.6	229.0	+4.4	+15.4
Mercury					
Monterey	201.6	211.1	213.1	+2.0	+11.5
Montclair	-	-	-	-	-
Park Lane	-	-	220.1	-	-
Oldsmobile					
88	204.0	208.2	208.2	none	+4.2
Super 88	-	-	-	-	-
Ninety-Eight	214.8	216.7	216.7	none	+1.9
Plymouth					
All models	188.4	204.6	204.6	none	+16.2
Pontiac					
Chieftain	202.8	206.8	210.5	+3.7	+7.7
Super Chief	202.8	206.8	215.5	+8.7	+12.7
Star Chief	-	214.8	215.5	+1.7	-
Bonnevillle	-	-	211.7	-	-
Studebaker					
Champion	198.0	202.4	202.4	none	+4.4
Commander	202.8	202.4	202.4	none	-0.4
Hawk Series	-	203.9	203.9	none	-

	1953	1957	1958
Longest	Cadillac 75 242.4	Cadillac 75 236.2	Cadillac 75 237.1
Shortest	Plymouth 188.4	Chevrolet 200.0	Ford Custom 202.2

Greatest 1-yr increase	Chevrolet	+9.1 (All models)
Greatest 1-yr decrease	Chrysler	-1.1 (Windsor, New Yorker)
Greatest 5-yr increase	Dodge	+23.0 (Apparent)
Greatest 5-yr decrease	Cadillac	-5.3 (Series 75)

<sup>a</sup> In inches. Does not include "compact" types or station wagons  
<sup>b</sup> Approximate lengths of comparable models.

The replies to this survey were most detailed, and the 50 percent response of engineers is felt to be extremely high because the survey was made in the name of an individual with no inference of any official connection to any organization. All but one response (exclusive of the manufacturers) expressed concern over increasing vehicle dimensions. The high response rate is considered indicative of the growing alarm of engineers toward the effects of the big car trend.

TABLE 5  
COMPARATIVE VEHICLE WIDTHS<sup>a</sup>

Vehicle	1953 <sup>b</sup>	1957	1958	1-Yr Change	5-Yr Change
Buick					
Special	75.6	74.8	78.0	+3.2	+2.4
Century					
Super	80.4	77.6	79.7	+2.1	-0.7
Roadmaster					
Limited	-	-	79.7	-	-
Cadillac					
Series 60	81.6	80.0	80.0	none	-1.6
Series 62	80.4	80.0	80.0	none	-0.4
Series 75	80.4	80.0	80.0	none	-0.4
Eldorado	-	80.0	80.0	none	-
Chevrolet					
All models	74.4	73.9	77.7	+3.8	+3.3
Chrysler					
Windsor	76.8	78.8	79.6	+0.8	+2.8 &
Saratoga	81.6				-2.0
New Yorker					
De Soto					
Firesweep	76.8	78.2	78.3	+0.1	+1.5
Fire dome					
Fireflite					
Dodge					
All models	74.7	77.9	78.3	+0.4	+3.9 &
Edsel	73.2				+5.1
Edsel					
Ranger	-	-	78.8	-	-
Pacer					
Corsair	-	-	79.8	-	-
Citation					
Ford					
All models	74.4	77.0	78.0	+1.0	+3.6
Imperial					
All models	-	81.2	81.2	none	-
Lincoln					
All models	78.0	80.3	80.1	-0.2	+2.1
Mercury					
Monterey	74.4	79.1	81.0	+0.9	+6.6
Montclair					
Park Lane	-	-	81.0	-	-
Oldsmobile					
All models	76.8	76.4	78.5	+2.1	+1.7
Plymouth					
All models	73.2	78.2	78.2	none	+5.0
Pontiac					
Chieftain	76.8	75.2	77.4	+2.2	+0.6
Super Chief					
Star Chief	-	75.2	77.4	+2.2	-
Bonneville	-	-	77.4	-	-
Studebaker					
Champion	69.6	75.8	75.8	none	+6.2
Commander					
Hawk Series	-	71.3	71.3	none	-
	1953		1957		1958
Widest	Cadillac 60 Chrysler V8C59 81.6		Imperial 81.2		Imperial 81.2
Narrowest	Studebaker 69.6		Stud Hawks 71.3		Stud. Hawks 71.3
Greatest 1-yr increase		Chevrolet	+3.8 (All models)		
Greatest 1-yr decrease		Lincoln	-0.2 (All models)		
Greatest 5-yr increase		Mercury	+6.6 (Monterey, Montclair)		
Greatest 5-yr decrease		Chrysler	-2.0 (Apparent)		

<sup>a</sup> in inches. Does not include "compact" types or station wagons.  
<sup>b</sup> Approximate widths of comparable models.

TABLE 6  
PASSENGER VEHICLES 18 FT AND OVER IN LENGTH

1953	1957	1958
Cadillac	Cadillac	Buick
Series 60	Series 60	Super
Series 62	Series 75	Roadmaster
Series 75	Eldorado	Limited
Chrysler	Chrysler	Cadillac
V8-C-59	Windsor	Series 60
Packard	Saratoga	Series 62
8-2626	New Yorker	Series 75
	300	Eldorado
	Continental	Chrysler
	De Soto	Windsor
	Fire dome	Saratoga
	Fireflite	New Yorker
	Imperial	300
	All models	Continental
	Lincoln	De Soto
	All models	Firesweep
	Oldsmobile	Fire dome
	Ninety-Eight	Fireflite
		Edsel
		Corsair
		Citation
		Imperial
		All models
		Lincoln
		All models
		Mercury
		Park Lane
		Oldsmobile
		Ninety-Eight

Much of the data accumulated by the survey is of interest. The following cities reported recent, current or planned lengthening of the distance between parking meters: Boston, Elmira, N. Y., Kansas City, Mo., Pittsburgh, and Wichita.

In addition, Los Angeles reported using a double stall arrangement with 8-ft adjacent maneuvering areas. Cleveland, and several of the other cities mentioned, reported difficulty with off-street parking facilities.

Thus, almost  $\frac{1}{3}$  of the cities contacted (24) in a purposely random sampling reported difficulty in coping with parking facilities for late model cars. Several of the replies strongly denounced the trend. Two of the replying traffic engineers urged government regulation of vehicle dimensions.

Dodge and Chrysler spokesmen defended the big car on the grounds that public demand forces such styling. The Chevrolet representative stated that Chevrolet's length had increased only  $4\frac{1}{8}$  in. since 1942. Just one month later, Chevrolet announced the 1958 models, 9.1 in. longer than those of 1957, resulting in a 5-yr increase of 13.5 in. American Motors answered the survey letter as previously indicated.

In summary, this spot survey, though limited in its scope, produced a high per-

centage of opinion that big car styling is an increasingly serious detriment to the capacity of existing and future parking facilities. Such styling is already producing economic loss in the form of meter moving and pavement repainting costs, reduction of parking capacities and consequent reduction of meter and commercial facility revenues, and the fact that new off-street facilities must be designed to accomodate these large vehicles.

Tables 4, 5 and 6 show automobile length and width increase over 1- and 5-yr periods, and the increase of 18 ft long passenger vehicles over 1- and 5-yr periods.

L. H. NAGLER, Closure—Mr. W. F. Hallstead is to be complimented on his analysis of the "big-car complex." As he indicates, the buying public has been preconditioned to accept big, heavy cars as marks of social prestige, riding comfort and safety. This result has been accomplished through expenditure of many millions in advertising budgets by the major car manufacturers, taking advantage of and further promoting the typical American proneness for bigger, more powerful, more impressive property.

Bigness and overweight are not necessary for automotive riding comfort and safety on the highways. It is difficult to combat the public misconception of these phases—merely offering sensibly-sized, sensibly-powered cars apparently is not enough, when unsupported by huge advertising budgets. There are indications that the driving public is becoming more aware of some of these factors, and is finding that compact cars are

ideally suited to their needs for personal transportation. Moreover, compact cars can be purchased and operated at considerably less cost.

Supplementing Hallstead's data on car sizes, Table 7 indicates average lengths and widths represented by the eight makes in normal highest production volume, for the years 1938-1958. These data were mentioned in the original paper, but specific values were not presented.

Another index of the growth of car size is to be found in Table 8, which shows the theoretical "shadow" of cars at 10-yr intervals.

TABLE 7  
AVERAGE LENGTHS AND WIDTHS<sup>a</sup>

Year	Average Length	Average Width
1958	211.67	77.61
1957	208.64	76.68
1956	206.51	76.11
1955	206.12	76.05
1954	205.12	75.84
1953	202.51	75.55
1952	203.44	75.65
1951	204.15	75.96
1950	203.04	76.12
1949	203.49	75.58
1948	205.69	76.17
1947	205.95	76.45
1946	205.67	76.70
1942	202.79	74.17
1941	203.42	74.42
1940	198.68	72.17
1939	195.24	71.71
1938	193.53	70.83

<sup>a</sup> Makes of cars were Ford, Chevrolet, Plymouth, Buick, Oldsmobile, Pontiac, Dodge, and Mercury. These makes represented from 72.90 percent to 88.90 percent of total domestic production for the 18 years covered.

TABLE 8  
THEORETICAL "SHADOW"

Year	Average Width and Length	"Shadow" (sq in.)	Increase in 10-Yr Period (%)
1958	78.4 x 212	16,621	5 <sup>a</sup>
1948	76.4 x 207.2	15,797	10
1938	72.3 x 199.1	14,338	25
1928	67.3 x 169.7	11,440	-

<sup>a</sup> Total increase 50 percent in 30-yr period.