

## GROSS RETAIL SALES AND AUTOMOBILE PARKING REQUIREMENTS

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An analysis of retail sales as a means of determining the number of spaces, distribution of spaces, and the design and function of the parking terminal is not proposed as a method to replace any of the techniques heretofore used. The origin and destination techniques which have been applied in the central business districts provide the overall analyses with valuable and contributing data. Retail sales as a source of data, when analyzed, provides a community with a true picture of parking requirements and not one of an existing parking pattern. This is the only contribution retail sales can make to the solution of the parking problem; however, these are important data upon which a parking plan is formulated. The location of existing parking lots does not necessarily represent centers of parking demand. An analogy to this is the origin and destination survey technique of traffic which has proven that the flow of traffic on a major thoroughfare does not necessarily represent the traffic demand characteristics of the area served by the thoroughfare.

The origin and destination parking study among other travel habit information obtains the following data: 1 - number of persons per automobile, age and sex; 2 - time duration parked; 3 - place where automobile is parked; 4 - destination of auto occupants.

### FRAMEWORK FOR A PARKING-PLAN

The number of parking spaces required at any one point in the central business district is related to the drawing power

of the traffic generator which the parking facility serves. The drawing power of a retail outlet varies during the week, the month, the season, and the cyclical periods. (See Figures 1, 2 and 3.) The table which follows shows the varying daytime peaks in the use of an attendant type parking terminal serving primarily a large department store in the central business district of Grand Rapids, Michigan.

<u>Daytime Peaks</u>	<u>Volumes Parked</u>
Nov. 15, 1946 --	105 automobiles
Nov. 20, 1946 --	110 automobiles
Nov. 30, 1946 --	135 automobiles
Dec. 7, 1946 --	150 automobiles
Dec. 9, 1946 --	150 automobiles
Dec. 14, 1946 --	155 automobiles

It will be noted that the use of the parking terminal increased as the Christmas buying period developed. A high daytime peak was experienced during the month of March of the following year (See Figures 4 and 5). These varying daytime peaks reflect seasonal fluctuations in retail sales.

The character of retail sales influences "total parking requirements". Together with destination data from parking studies "total parking space requirements" for any time during the seasons of the year can be developed.

In most central business districts there are a number of non-retail land and other structural uses. In terms of "net land area" the land in the central business district of Grand Rapids is used in the following manner:

Land Use (Figure 6)	Percent
Retail Sales	42.4
Parking areas (existing)	19.5
Industrial	13.1
Professional offices	9.7
Institutional	6.5
Hotels	3.2
Gasoline filling stations	2.4
Wholesale	1.6
Residential	1.6

CHARACTER OF RETAIL SALES

Before interpreting retail sales in terms of parking space requirements it is necessary to examine the character of retail sales. This examination falls into two parts: (1) an examination of the regional pattern of retail sales characteristics; and (2) an examination of the daily, seasonal, and cyclical fluctuations in retail sales.

The United States retail census in 1939

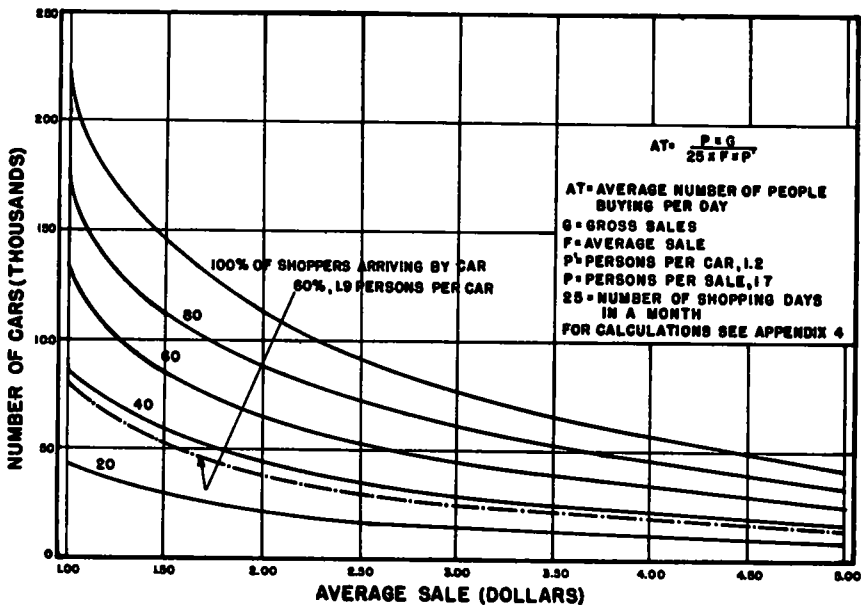


CHART 10

SOURCE CITY PLANNING COMMISSION

Figure 1. Parking Space Demand for Customers Retail Sales Central Business District, Peak, 1946.

The bulk of the "total parking space requirements" for the central business district are those required for retail sales, industrial, professional offices, and hotels (68.6 percent). The remaining uses are not major factors seriously affecting the "total parking space requirements" for the entire district.

If a graphic illustration could have been prepared showing floor areas, the area for retail sales would have shown an even greater proportion of the total floor area usage. However, it is apparent even from scrutinizing the land area data that the retail sales function is the major factor in determining "total parking space requirements".

provided sales data in the following groups; Foods, general stores, apparel, furniture, household and radio, automotive, filling station, lumber, building and hardware, eating and drinking places, drug stores and other stores.

These groups except for a few insignificant exceptions can be categorically generalized: A - Convenience and soft goods; B - Style and hard goods.

Convenience and soft goods have, in most cities, become a sales function for neighborhood and community centers. Style and hard goods are predominately a central business district sales function. Style and hard goods lines require large inventories representing a relatively high

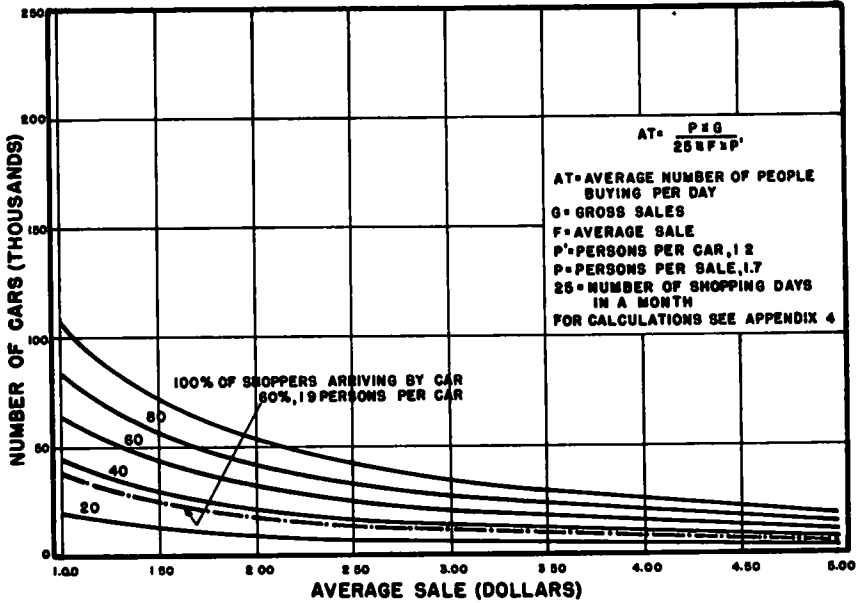


CHART 9

SOURCE: CITY PLANNING COMMISSION

Figure 2. Parking Space Demand for Customers Retail Sales Central Business District, Low, 1946.

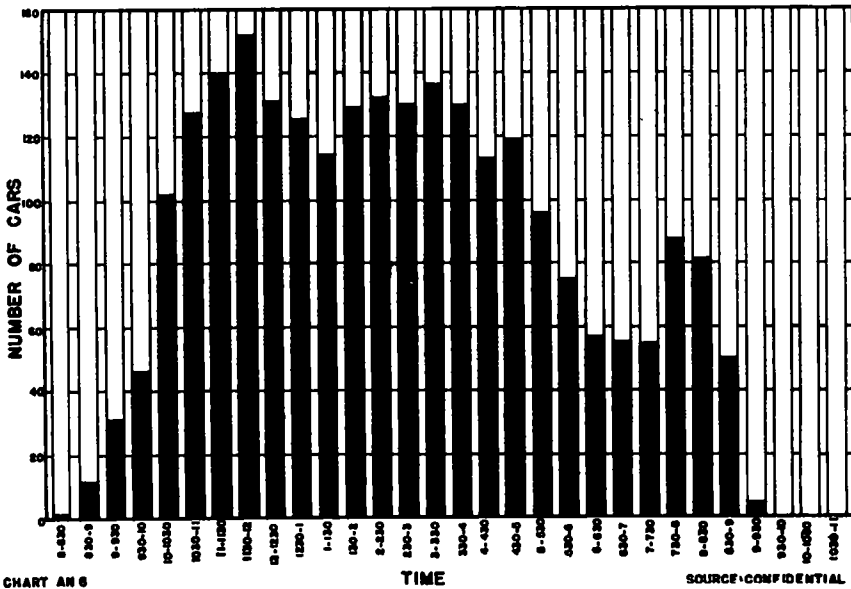


CHART AN 6

SOURCE: CONFIDENTIAL

Figure 3. Net Cars Remaining on Downtown Parking Lot Saturday, December 14, 1946.

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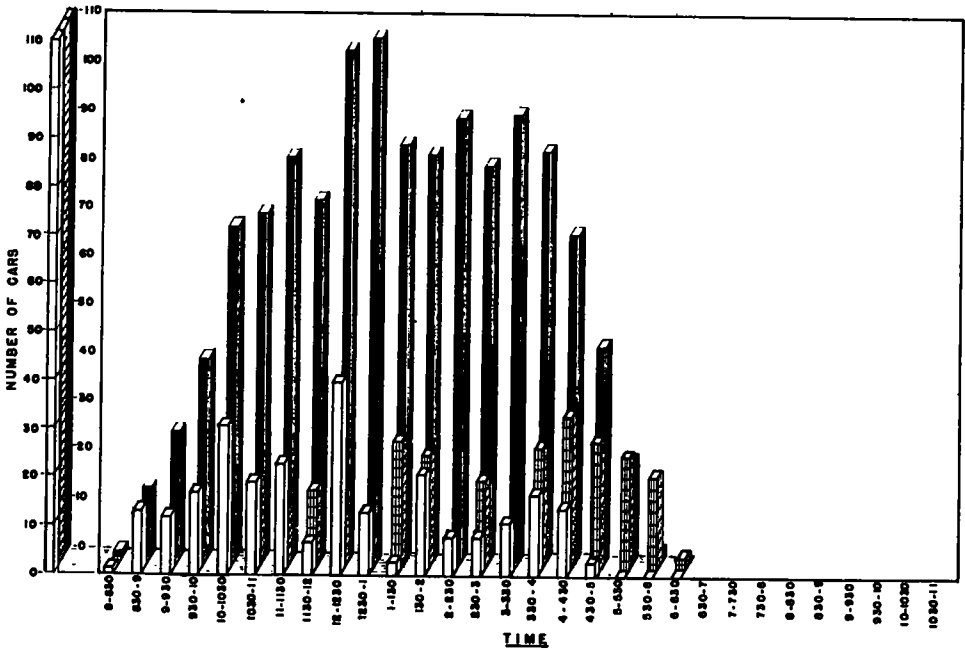


CHART CAR ARRIVALS CAR DEPARTURES NET CARS ON LOT SOURCE CONFIDENTIAL

Figure 4. Operational Data - Downtown Parking Lot, Wednesday, March 12, 1947.

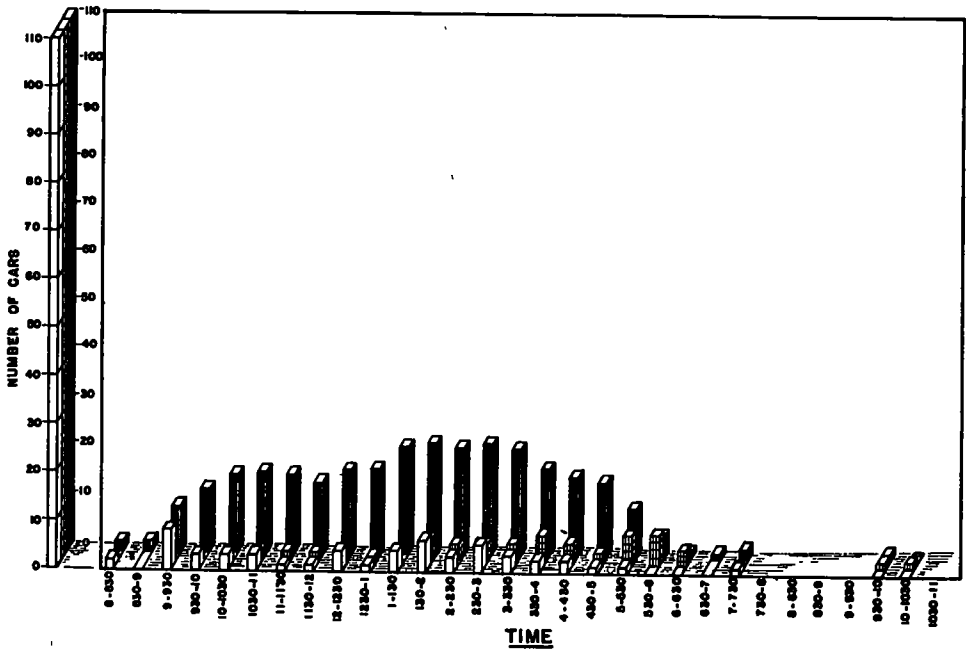


CHART CAR ARRIVALS CAR DEPARTURES NET CARS ON LOT SOURCE CONFIDENTIAL

Figure 5. Operational Data - Downtown Parking Lot, Tuesday, March 25, 1947.

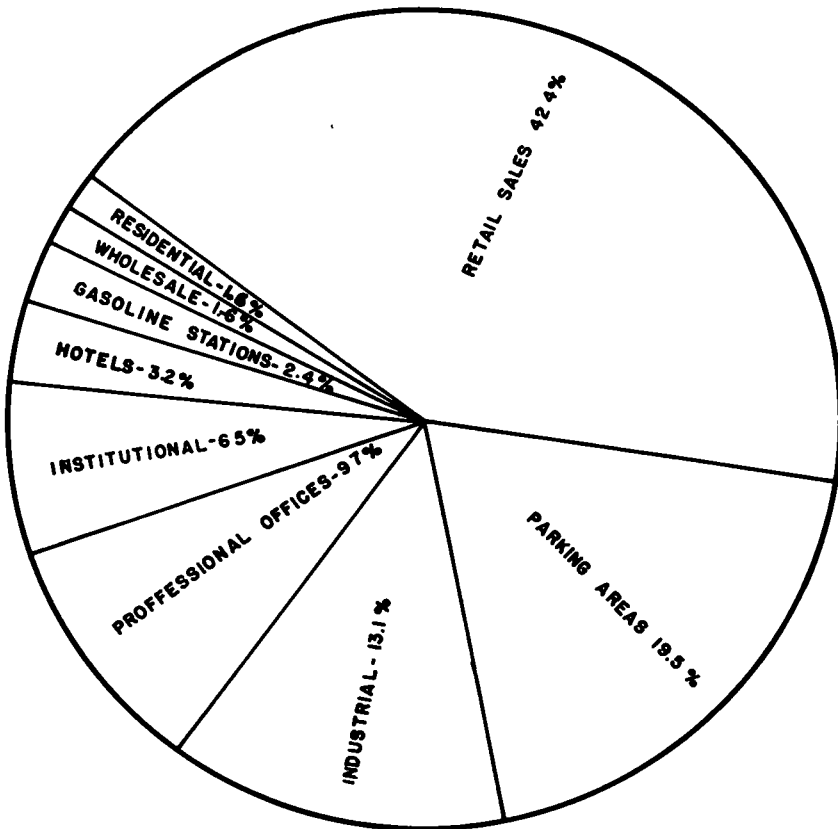


Figure 6. Types of Land Use in Downtown Area.

investment. These sales functions have not decentralized because of this retail sales characteristic. In urban places of one million people or more it has been economically feasible for some department store operations to decentralize. However, in urban places the size of Grand Rapids (250,000) decentralization of these sales functions would not be economically feasible.

In large metropolitan areas the regrouping of the central business district functions in one or more decentralized points has been planned. This process has become known as recentralization.

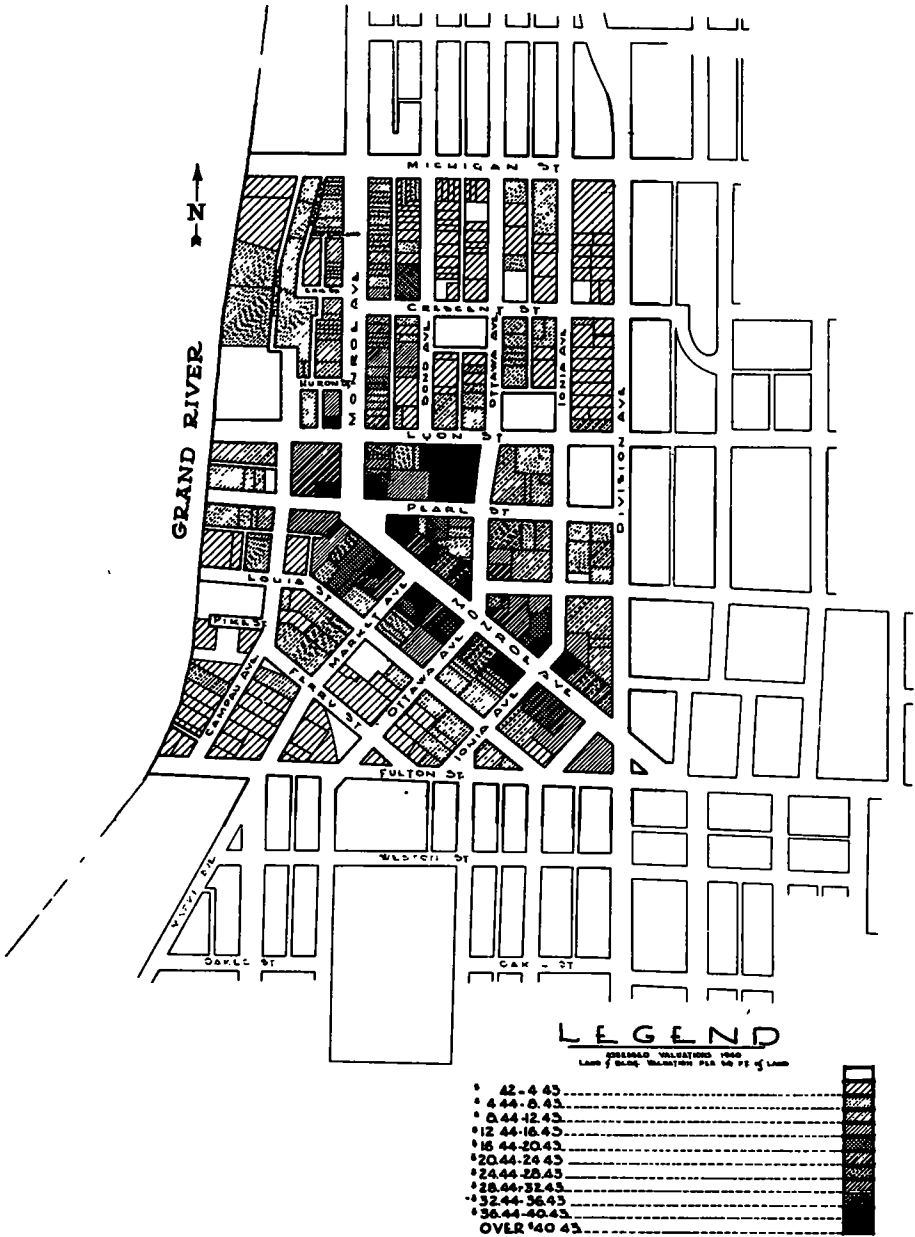
If there is any one predominate sales function and the centripetal force in the central business district it is the department store. The origin and destination study of Grand Rapids showed those blocks in which the 3 leading department

stores are located to be the points of heaviest destination of trips to the business district.

In the central business district of Detroit an origin and destination parking survey showed the blocks in which the J. L. Hudson department store is located to be one of the heaviest points of destination (see Figure 7). It is revealing to note the correlation of the heavy points of destination and the places of high assessed valuation (see Figure 6 showing downtown property values in Grand Rapids). Although the O.D. study has not been completed<sup>1</sup> for Grand Rapids previews have shown a remarkable relationship between the two. Assessed valuations do reveal generalized data on economic rent. Economic rent is a product of the

<sup>1</sup>As of December 1, 1948.

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CITY PLANNING COMMISSION  
 GRAND RAPIDS, MICHIGAN

Scale: 1" = 100' -  
 SOURCE: CITY ENGINEERING OFFICE

Figure 7. Downtown Grand Rapids Parking Study,  
 General Property Values per sq. ft. of Land

total earning ability of land and reflects the relative number of customer destinations.

The retail business of the central business district is composed of sales in

general merchandise (G), apparel (A), and furniture (F).

A comparison of the G.A.F. sales in each of the counties in the trading area tributary to Grand Rapids is summarized in Table 1.

TABLE 1

<u>County Name</u>	<u>GAF Sales per capita</u>
<sup>1</sup> Kent County (Grand Rapids)	\$102. per capita
<sup>3</sup> Montcalm	28. per capita
<sup>3</sup> Isabella	34. per capita
<sup>3</sup> Clare	33. per capita
<sup>2</sup> Ottawa (Holland, Mich.)	48. per capita
<sup>3</sup> Newaygo	17. per capita
<sup>3</sup> Oceana	12. per capita
<sup>3</sup> Allegan	22. per capita
<sup>3</sup> Van Buren	30. per capita
<sup>3</sup> Wexford	24. per capita
<sup>1</sup> Grand Traverse (Traverse City)	92. per capita
<sup>3</sup> Ionia	34. per capita
<sup>3</sup> Clinton	24. per capita
<sup>1</sup> Saginaw (Bay City-Saginaw-Midland)	82. per capita

<sup>1</sup>Regional Shopping Centers.

<sup>2</sup>Secondary Regional Center.

<sup>3</sup>Neighborhood and Community Shopping Centers.

It will be noted that the per capita G.A.F. sales is high in Grand Rapids, Traverse City, and Saginaw, and the per capita sales of the same group in the neighborhood and community shopping centers, which fall geographically between these peak points, have very low comparative sales records in the G.A.F. group. Reasons for this difference is that the central business district is a regional shopping center and serves the people living in these areas of low recorded G.A.F. sales as well as the people living in the metropolitan district of Grand Rapids. These patterns can be developed for any of the regional areas in the United States.

In comparison, the convenience and soft goods per capita sales are relatively higher in the neighborhood and community shopping centers than is shown for regional cities.

An examination of the variations in retail sales is made to determine the stability of retail sales trends as a basis for studying parking needs.

During the past 8 years retail sales and costs of living indices have on the face of it reflected anything but stability.

Retail sales for Grand Rapids, as re-

corded by the 1939 United States Census of Retail Business, showed a gross volume of \$80 million dollars. Recent estimates for the same city showed \$222 million of gross retail sales. Reflected in this increase are increased cost of all items as well as an ever expanding regional service area of the central business district. Metropolitan population increases is one of the primary causes for these increases in retail sales.

The Bureau of Business Research of the Harvard University Graduate School of Business Administration has maintained a long time record of department store operations. This bureau has maintained a running record of the same thirteen firms from 1939 to the present time. These thirteen department stores represent typical operations and therefore are excellent examples to appraise in terms of stability. (See Figure 8.) It will be noted that the gross retail sales in 1939 was \$240 million, and in 1947 the same stores did a gross of \$570 million. If the annual number of purchases made and the average dollar value of the purchases had remained relatively the same, the gross retail sales for these stores would have represented approximately \$450 million. (See Figure 9.) The difference of \$120

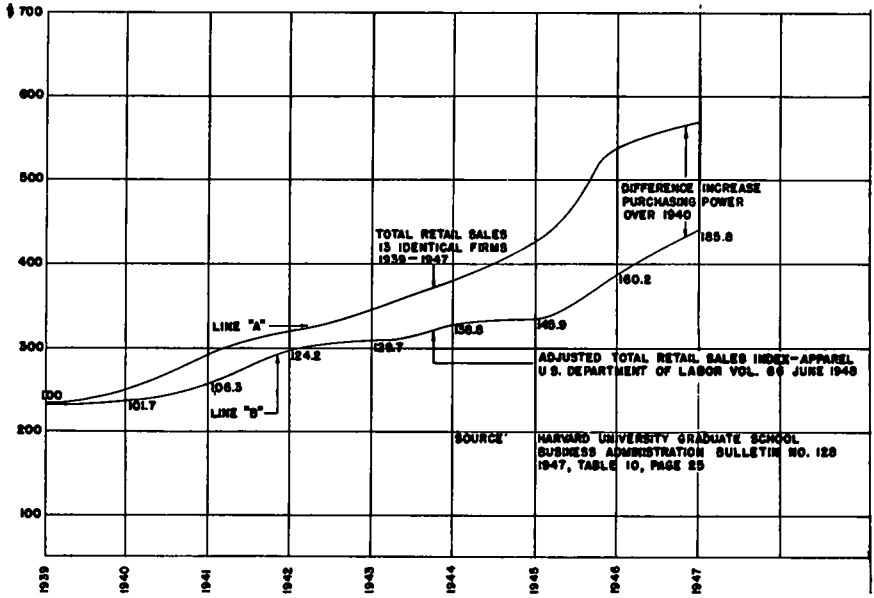


Figure 8. Characteristics of Retail Sales.

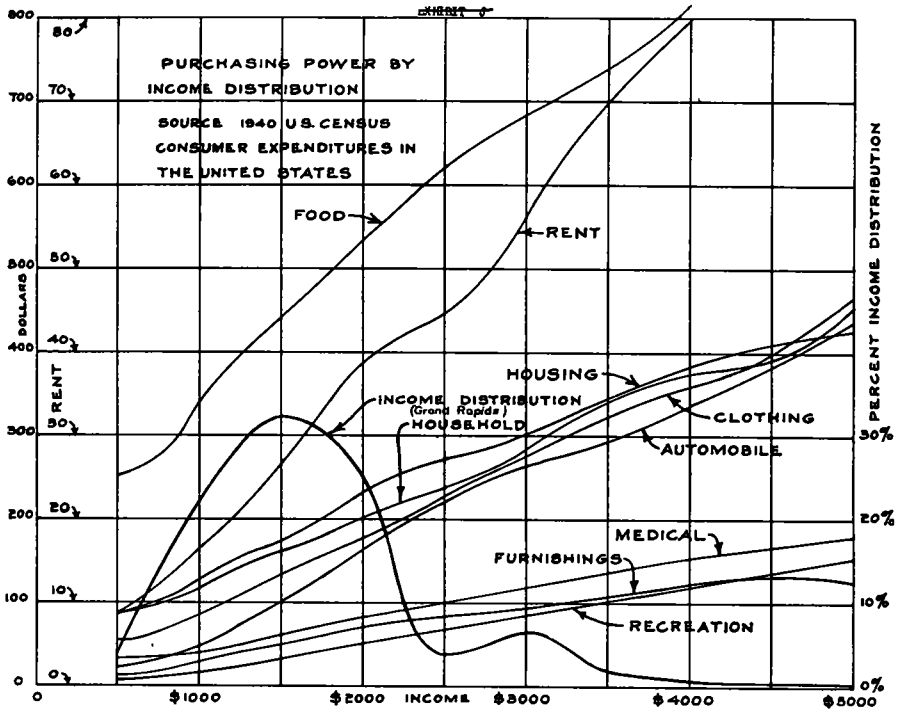


Figure 9.



million is a product of the increased dollar value of each purchase made and increased relative incomes of the consumer due to the tight condition of the labor market. Line A on Figure 8 shows actual gross retail sales; line B shows adjusted sales. Difference is increased purchasing power.

An examination of average gross sales, number of transactions per square foot of gross floor space, gross retail sales per square foot of selling space and gross re-

of floor space. Kenneth C. Welch, Vice-President of the Grand Rapids Store Equipment Company and Chairman of the Grand Rapids City Planning Commission has conducted pedestrian traffic surveys of leading department stores for a period of more than 20 years and analysis of these data indicate there are .75 persons per transaction.

In Table 2 these retail sales data are listed to show changed by years.

The conversion of these data into a

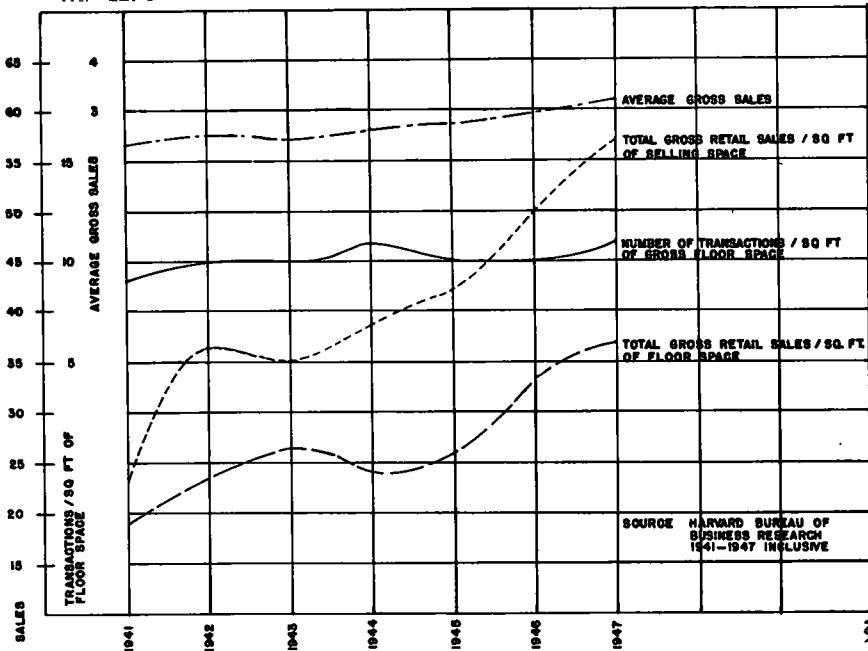


Figure 10. Productivity of Department Store Floor Areas.

area will reduce the total gross sales to a basis upon which stability can be observed. (See Figure 10.) It will be noted that graphic lines of gross retail sales per square foot of selling and gross floor areas are parallel. Authorities claim that these 2 sets of data are constantly changing due to interior renovation programs of department store managements. However, for purposes of determining parking requirements the floor area changes do not reflect any particular change in "total parking space requirements".

The significant characteristic of retail sales is the minor change experienced in number of transactions per square foot

form for comparison by indices shows that the sales per square foot of selling space and total sales indices are almost identical, which indicates that the selling areas are adjusted to meet the needs of the sales pressures. Average gross sales index reflects the cost of living index more than it reflects increased purchasing power. Transaction index reflects only a minor change as was shown where the transactions per square foot of floor space changed from 9 to 11 over the inflationary years. The following Table 3 shows these indices by years. (See Figure 11.)

These adjustments of sales data show that, even though retail sales volumes

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TABLE 2

Retail Sales - 2 million to 5 million<sup>1</sup>

	<u>1941</u>	<u>1942</u>	<u>1943</u>	<u>1944</u>	<u>1945</u>	<u>1946</u>	<u>1947</u>
Sales per sq. ft. Transactions	\$19.00 <sup>2</sup>	23.50 <sup>3</sup>	26.50	24.00	26.00	33.00	37.00
per sq. ft. of total space	9	10	10	11	10	10 <sup>4</sup>	11
Average gross sales	\$ 2.31	2.45	2.40	2.60	2.75	2.85	3.20
Sales per total employees	\$7,000		8,800	9,600	9,700	11,300	11,500
Gross floor space per employee sq. ft.	365		330	400	370	345	310
Sales per selling employees	\$23.00	36.50	35.00	38.50	42.00	50.00	57.00

<sup>1</sup> 4 million group included for years.

<sup>2</sup> Table 9 - page 18. Bulletin 115 - 1941 Harvard.

<sup>3</sup> Table 12 - page 17. Bulletin 119 - 1943 Harvard.

<sup>4</sup> Estimated by Author - 1945 Ratio - 14-10 Assumed same ratio for 1946.

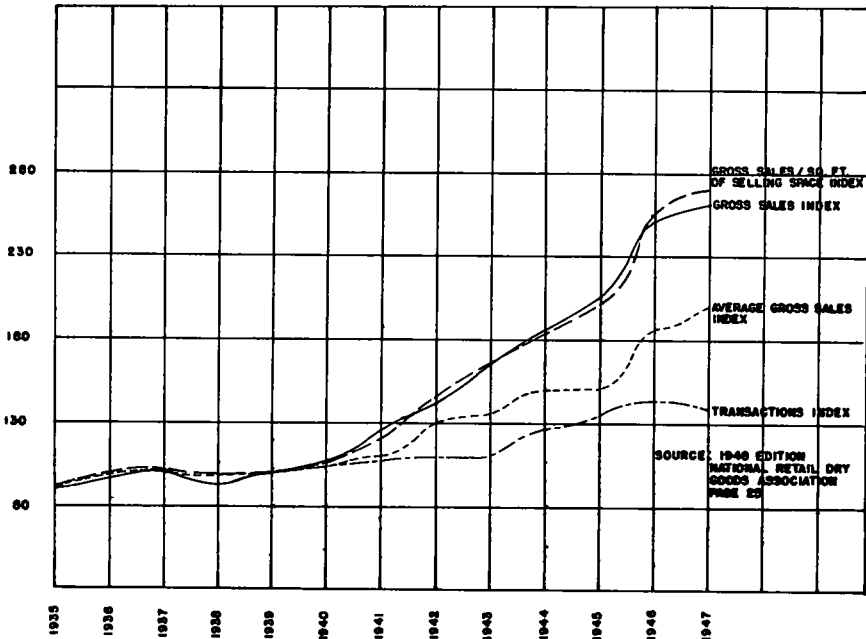


Figure 11. Total Store Data for Department and Specialty Stores.

have risen, the number of transactions have not increased to the same extent and of course the number of transactions is the factor related to total parking space requirements.

The second phase of retail sales characteristics, is an examination of the characteristics of seasonal changes in retail sales volume as a part of the necessary criteria upon which parking policy

TABLE 3

<u>Sales Index</u> <u>1939 equals 100</u>	<u>Average gross</u> <u>sales index</u> <u>1939 equals 100</u>	<u>Transactions</u> <u>index</u> <u>1939 equals 100</u>	<u>Sales per square foot</u> <u>of selling space index</u> <u>1939 equals 100</u>
1935 - 88	1935 - 88		1935 - 93
1936 - 97	1936 - 96		1936 - 100
1937 - 102	1937 - 102		1937 - 103
1938 - 95	1938 - 98		1938 - 100
1939 - 100	1939 - 100	1939 - 100	1939 - 100
1940 - 106	1940 - 104	1940 - 103	1940 - 103
1941 - 125	1941 - 116	1941 - 108	1941 - 123
1942 - 141	1942 - 131	1942 - 110	1942 - 145
1943 - 165	1943 - 137	1943 - 120	1943 - 165
1944 - 185	1944 - 150	1944 - 127	1944 - 194
1945 - 205	1945 - 153	1945 - 133	1945 - 200
1946 - 252	1946 - 187	1946 - 144	1946 - 255
1947 - 262	1947 - 200	1947 - 138	1947 - 270

may be formulated. Seasonal fluctuations in retail sales is very marked in its relation to parking requirements (See Figure 12). Seasonal fluctuations in food sales is less than in total sales. In consideration of the G.F.A. character of central business district sales the seasonal fluctuations would consequently be greater than exhibited by total sales tax collections.

Shall the total parking space requirements be determined based upon low, medium or high periods of retail sales volumes? The merchants' profitable business is a product of high periods of retail selling. Average sale periods provide for operational costs, the net profits are produced as a result of high efficiency, maximum sales, and complete use of all selling floor areas of the store during peak periods.

With proper recognition of the above facts "total parking space requirements" should therefore be planned for peak seasonal parking demand.

In summary, retail sales volumes present a basis upon which the entire problem of providing "total parking requirements" for a central business district can be examined. The cyclical and seasonal changes when reduced to number of customers form a dynamic base upon which both merchant and municipal policy can be predicated.

#### CONVERSION OF RETAIL SALES INTO PARKING REQUIREMENTS

Two methods are recommended for appraisal, examination, and improvement.

The first of these 2 methods was developed by Kenneth C. Welch, Chairman of the Grand Rapids City Planning Commission. The object of the first method is to ascertain the relationship of dollar sales to square foot area of parking required. (See Figure 13.) Assuming that a department store's annual retail sales volume in 1940 was \$100,000, of which 10 percent was done in mail order business, the actual store gross sales was \$90,000 or an average of \$300 per day. The average gross sale in 1940 was \$2.33, converting these figures we find an average of 129 transactions per day. There are 1.7 times more transactions on a peak day than on an average day, or 219 transactions on a peak day. There are .75 persons per transaction or 164 persons doing business in the store. Origin and destination surveys have shown that there are 1.6 persons per automobile for autos having their origin in the urban area and 2.2 in automobiles having origin outside the urban areas. Therefore, 164 persons represents 102 automobiles. Department stores generate a 3.5 average daily turnover requiring 29 spaces. 29 spaces at 300 square feet of area per space repre-

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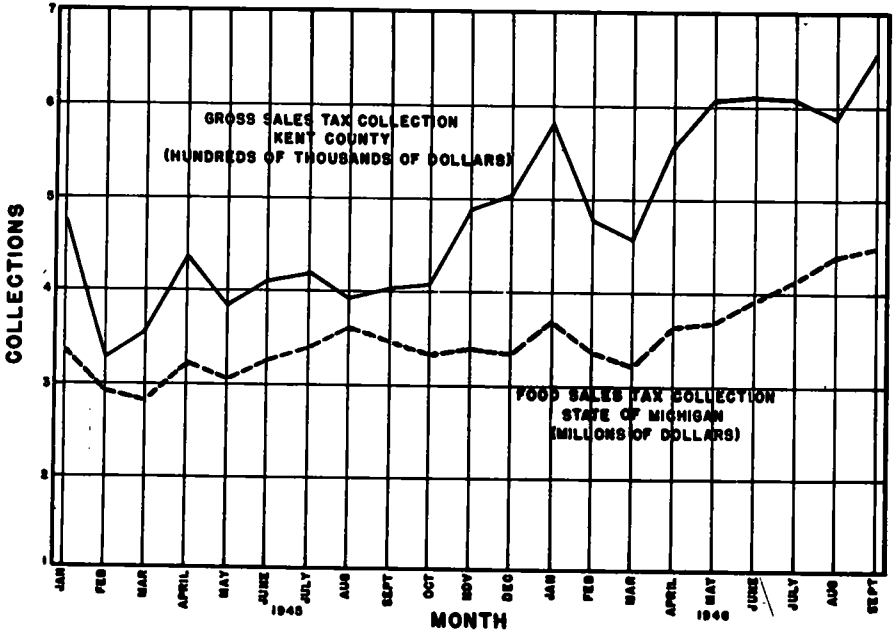


Figure 12. Sales Tax Collections.

$$R = \frac{\left( \frac{(V - MV)}{D} - G \right) \cdot R \cdot P}{P_1} \cdot T \cdot A$$

R = .067 SQ FT OF PARKING TO \$100 1940 RETAIL SALES

- R=RATIO
- V=ANNUAL GROSS RETAIL SALES VOLUME
- M=PERCENTAGE MAIL ORDER SALES VOLUME
- D=BUSINESS DAYS OF THE YEAR (300)
- G=AVERAGE GROSS RETAIL SALE (2 33)
- R<sub>1</sub>=RATIO OF LOW SALES DAY TO PEAK SALES DAY (17)
- P=PERSONS PER TRANSACTION (.75)
- P<sub>1</sub>=PERSONS PER AUTOMOBILE (1 6)
- T=TURNOVER IN USE PARKING SPACES
- A=AVERAGE AREA PER PARKING SPACE (300 SQ FT)

SOURCE KENNETH C. WELCH, A.I.A  
CHAIRMAN, GRAND RAPIDS  
CITY PLANNING COMMISSION

Figure 13. Ratio-Parking Area to 1940 Retail Sales Dollar.

sents .087 square feet of parking per 1940 United States Census sales dollar of retail sales as related to the general merchandise, apparel, and furniture group. All of the floor areas devoted to retail sales in a central business district can be generalized into terms of productivity. On an overall basis the summation of these productivity calculations will prove out by using the United States Retail Census data for any community and categorically arranging these data in terms of regional, community, and neighborhood functions.

The factor of mass transportation should be applied in reference to its actual use. Care should be given in the application of any mass transportation factor due to this particular phenomena that, as parking spaces increase, it has been found that the use of automobiles increase proportionately, and it is possible that mass transportation volumes may be reduced in the same ratio.

The second method has its only value in overall determination of "total parking requirements". Average number of people buying per day equals persons per sale multiplied by the number of transactions for any day; the product of this is divided by the product of 25 (the number of shopping days in a month), average gross sale, and persons per car. The application of this formula in Grand Rapids was used to select parking requirements for low and peak sales periods for 1946. In multiplying the number of daily transactions by the persons per sale we arrived at the total number of persons shopping during the low period of the year or the high

period of the year. The ratio of low and average persons per sale to high is 1.7 and .9 respectively. Converting the average number of people buying per day into automobiles we arrive at the number of cars coming to the central business district for shopping purposes.

The low and high retail sales periods were ascertained based upon United States retail census data and data from a local survey in which local businesses cooperated. The same procedure as outlined above can be used in other communities where the business men wish to participate. These types of data have their value as a preliminary basis upon which municipal policy can be determined and upon which administrators in line agencies of the municipality can decide upon the character of the action program used to approach the problem. (See Figures 1 and 2).

#### CONCLUSIONS

The use of retail sales volumes as a basis for determining parking requirements needs further appraisal and refinement than can be carried out by any one agency or any one city. It appears to be a method which will give the merchants and government officials a true picture of the proportions of the job to be done in solving a parking problem.

Retail sales data provides a community with a dynamic basis upon which total parking requirements can be ascertained and upon which a community or municipal policy relative to the problem can be developed.