

ORIGIN AND DESTINATION SURVEY METHODS AS APPLIED TO THE TRANSPORTATION STUDY—BALTIMORE METROPOLITAN AREA¹

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SYNOPSIS

The Baltimore Metropolitan Area comprises 170 square miles with an estimated population of 1,100,000. Because of the size of the study area and the time element involved, it was not possible to interview every resident, so the "sampling method" was used on a geographical distribution basis with census tracts as division units.

The Transportation Study was divided into three phases: (1) Internal survey, including (a) Sampling, (b) Home interviews, (c) Truck interviews, and (d) Taxi interviews; (2) External survey; and (3) Parking survey.

Before the home interviewing was started the selected personnel was thoroughly schooled and publicity by means of newspaper releases and radio broadcasts was given on the purposes of the Transportation Study and the manner in which it was to be conducted.

The sample was 5 percent for home interviews selected from land use maps and 20 percent for trucks and taxis. The truck sample was selected from the records of the Commissioner of Motor Vehicles and the taxi sample was obtained from the office of the Public Service Commission.

To check the accuracy and completeness of the expanded interview data against actual counts, three control points, outstanding easily recognized structures, and a screen line were selected. Daily volume counts were made and classified by type of vehicle at each of the control points and each of the ten streets and roads crossing the screen line. These volumes were then compared with volumes crossing the control points and streets and roads on the screen line as determined by the expanded interview data. For the 16-hour period from 6:00 A.M. to 10:00 P.M. the interview accuracy was 89 percent while a similar check for the morning and afternoon peak hours showed an accuracy of 98.5 percent.

The external survey determined the travel habits of persons driving inside and out of the metropolitan area. This was accomplished by roadside interviews at selected stations where all vehicles, other than military, federal, state-owned and regularly scheduled buses, were stopped.

The data obtained were used to prepare desired lines of travel for all types of motor vehicles including passenger cars, taxis and trucks and for mass transportation passengers. A traffic flow map prepared in 1938 was adjusted to compensate for the differences in traffic flow volume since that year, caused by changing certain streets from two-way to one-way travel. When compared to the major directional desire lines it shows where motorists are now traveling and the direction and volumes in which they would travel if suitable facilities were available. Fifteen routes closely conforming to the 16 major directional desire lines were studied.

Because of the seriousness of the parking situation a separate parking survey of the downtown area of Baltimore City comprising 127 city blocks was conducted. An inventory was made of all parking facilities, both on-street and off-street, in the selected area and for two blocks immediately outside of that area. At each of the facilities included in the downtown area, carefully-trained interviewers asked three questions of the driver of each car parked: (1) What is your home address?; (2) What is your destination?; and (3) What is the purpose of

¹ Conducted by the State Roads Commission in cooperation with the Public Roads Administration and Baltimore City.

your trip? Over 35,000 cars are parked in the downtown area during the 8-hr. period from 10:00 A.M. until 6:00 P.M. Of this total, 45 percent were parked at curbs, 17 percent in garages, and 38 percent on lots. The principal purposes of trips were found to be: Work—42.7 percent; Business—30.8 percent; and Shopping—17.3 percent.

As of October 31, 1946 the total cost of the parking study was \$27,413 and the cost of the internal and external studies was \$93,290.

In conducting origin and destination surveys for planning the improvement of roads and streets, what is required is a measure of the movement of persons and goods to determine the facilities required to meet the transportation needs. This is true for both rural and urban areas.

In rural areas this movement can generally be measured satisfactorily by counting and recording vehicles. If additional information is required the vehicles may be stopped and their origins and destinations ascertained as well as other data that may be pertinent to the purpose of the survey. In urban areas, however, this procedure will not suffice because traffic congestion and multiplicity of streets make roadside interviewing difficult. In addition to the movements of passenger cars, buses and trucks, we must measure the movements of individuals themselves whether they travel by private vehicle, truck, taxi, street car, bus, or otherwise and it is especially important to obtain information concerning origins and destinations. Further, we should know when, where, how, and for what purpose persons travel. In developing this information for urban studies it is desirable to know generally the routes traversed for each trip from origin to destination.

The Baltimore Metropolitan Area comprises 170 sq mi with an estimated population of 1,100,000. Because of the size of the study area and the time element involved, it was not possible to interview every resident, nor is it necessary, for persons living within a community have many similar travel habits for various purposes. The sampling method was used. The accuracy of this procedure has been proven by national public polls, the Bureau of the Census, and by the experiences of other metropolitan areas in conducting surveys of this nature. Its success depends on the selection of a truly representative sample. In Baltimore this was done strictly and inflexibly on a geographical distribution basis with census tracts as division units. Just as inflexibly

the samples selected were adhered to in the interviewing.

Phases of the Transportation Study

The Transportation Study was divided into three phases—

1. Internal survey, including:
 - (a) Sampling
 - (b) Home interviews
 - (c) Truck interviews, and
 - (d) Taxi interviews
2. External survey
3. Parking survey

The Sample

In selecting the sample for home interviews in Baltimore City, land use maps prepared by the Commission on City Plan were most useful. These maps were spot checked in the field. This is most important and we cannot urge too strongly a thorough field check of maps to be used in selecting the sample. The accuracy and completeness of the sample is a vital element in the success of the survey.

Because of inadequate maps selection of the sample in Baltimore County outside the City limits was more difficult. In areas where usable maps were available the sampling procedure was the same as in Baltimore City. In congested areas, where accurate maps were not available, field sampling was resorted to and in the more sparsely settled areas the sampling and interviewing was done at the same time.

The sample was 5 percent for home interviews and 20 percent for trucks and taxis. The truck sample was selected from the records of the Commissioner of Motor Vehicles. Selecting those in Baltimore City was rather simple as they were segregated in the records. For those in Baltimore County outside Baltimore City our samplers had to go through all truck registrations in the State, 80,000 cards, and segregate those for Baltimore County. The problem was made more difficult by the fact that only a portion of Baltimore County was

included in the study area. This required visits to the County Court House to ascertain from tax assessment and other records if the truck was owned within the area. This took time and added materially to the cost. Much time could have been saved if the records of the office of the Commissioner of Motor Vehicles had segregated registrations by counties and by towns. This is a simple matter in a State the size of Maryland, particularly if done when licenses are renewed. There are so many uses for the information that it is difficult to understand why it is not done.

The taxi sample was easily obtained from the office of the Public Service Commission where permits and franchises are issued and recorded.

The home interview sample totaled 12,070 which produced 13,176 completed interviews. Of these, 11,498 were in Baltimore City and 1,678 in Baltimore County. Only 487 of the total sample of 12,070 produced no interviews and only 63 of these, or 0.5 percent, were due to refusals. Most of the others were accounted for by vacancies and business establishments selected in the sample but containing no dwelling units.

The truck sample totaled 4,100, of which 3,651 were in Baltimore City and 449 in Baltimore County. They produced 3,861 interviews. The difference between the sample size and resultant interviews is due to the fact that some of the vehicles were out of operation and others were operating entirely outside the study area.

The total sample of 209 taxicabs were interviewed. Of these, 196 were in Baltimore City and 13 in Baltimore County.

Interviewing—Internal

Before starting the home interviewing the selected personnel was thoroughly schooled in the Manual of Instructions, interpretation of the forms, and questions to be asked as well as the manner in which they were to be asked.

Prior to the home interviewing a letter explaining the purpose of the survey and urging their cooperation, signed by the Governor of the State, the Mayor of Baltimore City, and the Chairman of the State Roads Commission, was sent to the occupant of each unit in the sample. The mailing of these letters was timed so as to reach the occupant just a few days in advance of the interviewer.

Full and complete publicity was given on the purposes of the Transportation Study-Baltimore Metropolitan Area and the manner in which it was to be conducted. This publicity was by newspaper releases and radio broadcasts. This paved the way for the fine reception received by our representatives. Our experience indicated that well-timed publicity and well-schooled interviewers contributed very materially to the success of the study. Because of the records kept it was a simple matter to compare the results obtained by interviewers schooled in the work with those obtained by persons put on and trained only by the supervisors after the work started. This demonstrated that thoroughly schooled personnel was most essential.

For home interviewing the area was divided into seven districts, each in charge of a supervisor. The headquarters for each interview district was the most centrally located fire department house. Contact with the supervisors was made daily by a liaison officer from the main office and the supervisors were in daily contact with the interviewers. During the entire time that the interviewing was in progress, meetings of the supervisors were held with the Director and the Assistant Director each Monday morning. At these meetings the work accomplished was critically reviewed, progress reports were submitted for each district, together with a record of the performance of each interviewer. While the interviewing was in progress it was found advisable from time to time, to interchange the supervisors as well as the interviewers, from district to district. This kept everyone alert and contributed materially to the completeness of the data obtained.

The interviews were made on week days from Tuesdays through Saturdays and the interviewers obtained from each member of the household five years of age or older, information on the travel on the day preceding the interview. Interviews were conducted for the selected sample only and no substitutes were permitted. The interviewing extended into military reservations where officers and men and their families who were permanent residents of the post were interviewed. In most cases the interviews were conducted under the supervision of the commanding officer. In hotels and institutions only permanent residents were interviewed, and in colleges and

schools where dormitories existed interviews were conducted in every twentieth room.

In a similar way letters were sent to truck owners and taxicab owners immediately prior to the interviewing. Full and complete information was obtained from these interviews, as we were able to use as key personnel, persons trained in home and roadside interviewing.

Interviewing—External

The external survey determined the travel habits of persons driving inside and out of the metropolitan area. This was accomplished by roadside interviews at selected stations where all vehicles, other than military, federal, state-owned and regularly scheduled buses, were stopped.

The cordon around the Baltimore Metropolitan Area is crossed by 54 state and county highways carrying a total of 136,731 vehicles daily according to traffic volume counts made prior to the roadside interviews. Roadside stations were established on the cordon line on 28 of these routes which carried 128,719 vehicles per day, or 94.14 percent of the total vehicles entering and leaving the area. Interviews were conducted for 24 hr at nine of these stations and for 16 hr at the remaining 19 stations. The stations were operated on week days, Mondays through Fridays, and the data obtained for the travel on the day of the interview.

Three interview parties were used totaling 28 men, including two supervisors and three party chiefs. In addition, two police officers were assigned to each party.

At each of the 28 roadside stations party members interviewed inbound and outbound traffic simultaneously while traffic recorders manually counted and classified the number of vehicles passing each hour. Information was obtained hourly on the number of passengers, including driver, type of vehicle, place of origin, place of destination, home address of driver of passenger car or the registration address of commercial vehicle with particular reference to whether within or outside the area, route on which vehicle entered or left the area, the location of each control point passed, purpose of trip, location of intermediate stops if within the area, and the registration whether in Maryland or other State. Each interview consumed less than one minute and 63.5 per-

cent of all vehicles passing through the roadside stations were stopped and interviewed.

Accuracy Check

In order to provide means of checking the accuracy and completeness of the expanded interview data from the internal and external surveys against actual volume ground counts, three control points and a screen line were established. The three control points were selected because they are outstanding structures easily recognized by the motorist which made it possible for the motor vehicle operator to answer the question—"Which of these control points, if any, did you pass on your trip?" Herring Run which traverses the northeastern section of the City was used as a screen line. It was not necessary to ask if it was crossed as this could be determined in the office by tracing the trip between origin and destination on a large-scale zone map.

Daily volume counts were made and classified by type of vehicle at each of three control points and each of the ten streets and roads crossing the screen line. These volumes were then compared with volumes crossing the control points and streets and roads on the screen line as determined by the expanded interview data.

For the 16-hr period from 6:00 AM to 10:00 PM the interview accuracy was 89 percent while a similar check for the morning and afternoon peak hours showed an accuracy of 98.5 percent. These checks indicate the accuracy and completeness of the study.

Division of the Study Area

For the purpose of studying traffic movements, the study area was subdivided by use characteristics such as residential, business, industrial, recreational, and others. The Baltimore Metropolitan Area for origin and destination purposes was divided into 9 Areas, 60 Districts, 153 Zones, and 1,077 Sectors.

The areas are wedged-shaped converging on the downtown area. They were laid out to ascertain traffic movements from the north, northeast, east, southeast, south, southwest, west, and northwest from points outside and within the study area into the business district of Baltimore City. Each area is fed by one or more arterial highways and in no case does the boundary of an area follow an arterial highway

or street but is so located as to come between two such arteries.

The areas are subdivided into districts in such a manner that traffic movements on each main thoroughfare can be traced, studied, and analyzed. In order to further study traffic movements within the district they were divided into zones. The zone is subdivided into sectors which are the smallest divisions. In the thickly congested downtown area of Baltimore the sector is equivalent to a city block, while in the more sparsely settled sections, a sector may include several blocks. A sector may also be a large industrial plant, shopping center, park, housing project, school, well-known place of amusement, or community center.

For analysis the zone was used as the smallest subdivision. All origins and destinations, however, were coded by sector, which will make possible the study of specific highway problems as needed.

Coding, Card Punching, and Tabulating

While the sampling was in progress a coding index map was prepared for the entire study area. This made it possible for the coding to start just as soon as the field data were received in the office and checked.

As soon as the coding for any phase of the transportation study was completed and checked the data were punched on cards. Some of the punching was done by our forces using equipment of the Maryland State Police and Baltimore City while the rest was done by contract. The punching was verified.

To give some idea of the magnitude of the job a total of 204,000 cards were punched of which 30,000 were for the Parking Survey.

After the cards were punched they were sorted and mechanical tabulations run to provide the information needed in the analysis.

Desire Lines of Travel

The data obtained from the tables compiled were used to prepare motographs or desire lines of travel for all types of motor vehicles including passenger cars, taxis and trucks, and for mass transportation passengers.

These directional desire lines are portrayed by straight lines or bands between roadside interview stations, between roadside stations and zones, and between zones. They are

drawn without regard to routes of travel and are carried to the center of gravity of population of each zone. In order to simplify the presentation they are shown separately for each of several volume groups.

To obtain a composite picture of travel by all types of motor vehicles, by trucks alone, and by mass transportation passengers, major directional desire lines of travel were drawn. These bands do not show trip length, neither do they establish the exact location for traffic routes. Each band is merely a grouping of the various desire lines close to each other and having a like direction into a band showing that directional desire. The major directional desire lines form the basis for the selection of the location of freeways or street improvement from the viewpoint of traffic service. The width of the bands gives an approximate indication of the number of vehicles the routes would attract.

A traffic flow map prepared by the Police Department of Baltimore City in 1938 was adjusted to compensate for the differences in traffic flow volume since that year, caused by changing certain streets from two-way to one-way travel. When compared to the major directional desire lines it shows where motorists are now traveling and the direction and volumes in which they would travel if suitable facilities were available.

Route Analysis

In selecting the routes for analysis those preferred routes closely conforming to the major directional desire lines of travel as established by the origin and destination survey were chosen.

For all types of motor vehicles 16 major directional desire lines of travel were drawn. A total of 15 routes and combinations were analyzed. For trucks 18 major directional desire lines were drawn and 22 were drawn for mass transportation passengers.

In assigning traffic to the different sections for the various routes it was assumed that the freeway would be used whenever time would be saved in doing so, even though the distance was somewhat longer. In making calculations, speeds were assumed to average 40 mi per hr on the freeway, from 18 to 20 mi per hr on existing streets in congested areas, and 25 mi per hr outside the congested areas.

The analysis of each route or combination was carried only to the point of finding the present daily traffic volumes potential to the routes and no attempt was made to determine future traffic growth for the next 10 or 20 yr. Historical records indicate that traffic will increase on an average of 5 percent per year.

Parking Survey

Because of the seriousness of the parking situation in Baltimore City a separate parking survey of the downtown area of Baltimore City comprising 127 city blocks was conducted. To have combined it with the home interviews would have required the asking of so many questions that we thought it would adversely affect the accuracy and completeness of the results of both the home interviews and the parking survey.

As the first phase of the study, an inventory was made of all parking facilities, both on-street and off-street, in the selected area and for two blocks immediately outside of that area. Filling stations and other locations where parking is permitted in connection with the servicing of vehicles were included.

At each of the facilities included in the downtown area, carefully-trained interviewers asked three questions of the driver of each car parked:

1. What is your home address?
2. What is your destination?
3. What is the purpose of your trip?

Cars which had been parked before the interviewers arrived were counted and the license numbers recorded. Information was obtained from the drivers of those vehicles if they left before the closing hour of the survey in the evening. A similar record of all cars remaining in the parking facilities was made at the close of work each day.

For off-street facilities, interviews were conducted from 10:00 AM until 6:00 PM, while at curbs the time of interviewing varied according to the period during which parking restrictions were in effect. Interviews were conducted on week days only, Monday through Friday.

The vehicles entering and leaving the business district between 10:00 AM and 6:00 PM were manually counted and classified at a cordon of stations surrounding the area. This work was scheduled so as to extend throughout the period of the interviewing. Only one count was made at each street crossing the

cordon. These counts were recorded by half-hour periods and by direction of travel, inbound or outbound. To provide a means of adjusting the cordon-line counts for abnormal conditions, nine control stations located on representative streets within the area were selected and continuous automatic counts made at these points for the duration of the interviewing.

The survey has supplied information on the types, capacities, location, and ease of access of facilities available, in addition to the following pertinent facts:

1. Where the people reside who park downtown
2. Where they park
3. What time of day they use the parking facilities
4. How long they park
5. Hours of greatest demand for parking space
6. Purpose for which trip was made
7. Destination after parking
8. Distance walked or otherwise traversed between parking space and destination.

While the analysis of the data accumulated has not been completed, it has progressed to a point where certain conclusions can be made. Over 35,000 cars are parked in the downtown area during the 8-hr period from 10:00 AM until 6:00 PM. Of this total, 45 percent are parked at curbs, 17 percent in garages, and 38 percent on lots and it was found that because of the turnover induced by restrictions, one-fourth of the parking spaces provided parking for approximately one-half of the total number of cars parked within the area.

The purpose for which trips are made is indicative of the length of parking. Those persons coming into the area for work generally park for the day and most of them use garages or lots where all-day, weekly, or monthly parking rates are low. The parking by purpose of trips was found to be:

Work	42.7 percent
Business	30.8 "
Shopping	17.3 "
School	0.3 "
Recreation	1.7 "
Other	6.5 "
Refused	0.7 "

It is expected that the continuing analysis, comparing the space-hr supply of space, the

TABLE 1
TIME AND COST ANALYSIS FOR EACH OF THE SEVERAL PHASES OF THE ORIGIN AND DESTINATION
AND PARKING SURVEYS FROM JULY 2, 1945 TO OCTOBER 31, 1946

	Date Started	Date Completed	Work Accompl.	Man Hours	Total Cost	Unit Cost
Sampling—Home Interviews, City and County	7- 2-45	9-29-45	11,937	5,036	\$ 6,931.43	\$0.58
Sampling—Truck Survey	8-21-45	10- 6-45	4,100	655½	866.57	0.21
Sampling—Taxi Survey	9- 9-45	10-13-45	209	64	101.63	0.49
Total Sampling			16,246	5,755½	7,899.63	0.49
Interviews—Home, City and County	9-18-45	11-30-45	13,663	18,140	24,418.41	1.79
Interviews—Trucks	10-17-45	1-25-46	3,861	5,339½	7,751.79	2.01
Interviews—Taxis	1-12-46	2- 9-46	209	85½	1,246.40	5.96
Total Interviews			17,733	24,335	33,416.60	1.88
External Survey—Office	9-18-45	4-15-46		764	2,340.08	
External Survey—Field	9-19-45	10-29-45	73,420	7,090	10,612.62	0.144
Total External			73,420	7,854	12,952.70	0.176
Coding—Index	7- 2-45	10-29-45		851	1,120.34	
Coding—Dwelling Information	10-31-45	12-20-45	74,675	2,831	4,083.62	0.070
Coding—External	10- 1-45	12-11-45	73,420	6,694½	9,027.95	0.123
Coding—Trucks	1- 7-46	1-29-46	16,878	1,056½	1,323.18	0.078
Coding—Taxis	1-14-46	1-29-46	9,934	527	694.31	0.070
Total Coding			174,907	11,930	16,249.30	0.093
Punching and Verifying—Dwellings	12-28-45	2-22-46	74,675	898½	1,446.45	0.019
Punching—External	11-16-45	12-27-45	73,420	359	620.76	0.008
Punching—Trucks	1-28-46	1-31-46	16,878	Contract	364.88	0.021
Punching—Taxis	1-31-46	1-31-46	9,934		197.27	0.020
Punching—Machine Rental					190.81	
Total Punching and Verifying			174,907		2,820.17	0.016
Sorting and Tabulating—Dwelling Information	3- 4-46	3-28-46	13,663	30½	48.20	0.004
Sorting—Trip Reports	2-22-46	4- 9-46	61,012	329	458.85	0.008
Total Dwelling—Information			74,675	359½	507.05	0.007
Sorting and Tabulating—External	2- 1-46	4-18-46	73,420	355½	522.95	0.008
Sorting and Tabulating—Trucks	3- 5-46	4- 3-46	16,878	71	126.59	0.008
Sorting and Tabulating—Taxis	3- 5-46	4- 4-46	9,934	139	206.94	0.021
Machine Rental					218.59	
Total—External			100,232	565½	1,105.07	0.011
Total—Sorting and Tabulating			174,907	925	1,612.12	0.092
Analysis—Internal and External	14-15-46	11- 1-46		7,911½	12,705.47	
Mapping—O. and D.	6- 1-46	11- 1-46		2,498	5,096.84	
Vari-typing Plates	7-16-46	9-27-46	575	416	537.27	0.934
Total				10,825½	18,339.58	
Parking—Preparations	2-23-46	3-31-46		4,020½	7,490.16	
Parking—Interviewing	3- 1-46	4-29-46	29,064	7,838	10,882.42	0.374
Parking—Counts	3- 1-46	4-29-46		777½	1,456.62	
Parking—Coding	4-30-46	6-14-46	29,064	3,625	4,902.92	0.169
Parking—Punching and Verifying	8- 1-46	8-15-46	29,064		588.54	0.020
Parking—Sorting and Tabulating	9-17-46		29,064	352	460.87	0.016
Parking—Analysis	4-15-46	11- 1-46		1,116½	1,631.37	
Total—Parking			29,064	17,729½	27,412.90	0.943
Total—Internal and External					\$ 93,290.10	
Cost as of Oct. 31, 1946					\$120,703.00	

use of that space and the demand for space, all block by block, will permit a reasonably accurate determination of the immediate deficiency and will indicate the areas where additional space is most needed.

Costs

In surveys of this nature costs are always important. In a spirit of helpfulness to those interested Table 1 is given. In this table is shown, for each phase of the survey, the date

started, the date completed, the man-hr consumed, the total cost, and the unit cost. In arriving at the unit cost for any particular part of the survey its total cost was divided by the number of units involved.

For example, the total cost of sampling including dwelling units, trucks, and taxis was \$7,899.63 and the total number of samples selected was 16,246 giving a unit cost of \$0.49 per sample. In a similar manner the unit cost for dwelling unit, truck, and taxi sampling can be obtained from the table as \$0.58, \$0.21, and \$0.49 per sample respectively.

Much time can be saved and costs reduced by planning the several stages of the work in a

manner designed to keep the data flowing in the proper order for analysis. If started properly it is possible to carry on several elements of the work simultaneously and makes possible the reduction of forces as phases of the work are completed. The personnel chart (Fig. 1) illustrates how we attempted to do this.

All phases of the origin and destination study have been completed and the report, in three volumes, is now being printed.

The analysis of the data from the parking survey is nearing completion and the report is being prepared in the rough as the data become available from the tabulations.

PROVIDENCE CENTRAL BUSINESS DISTRICT PARKING SURVEY¹

By LESTER P. MANNING

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SYNOPSIS

The findings from a parking survey consisting of the following correlated studies are presented:

1. Inventory of existing facilities.
2. Cordon count of vehicles.
3. Parking Interviews at curb and lot.

The feasibility of conducting several distinct operations of the survey during different periods by a limited force of field men was indicated on the basis of a 2 percent statistical error.

The demand for parking spaces is treated in terms of destination desire, and destination desire is analyzed quantitatively in terms of number of trips, and space-hours of parking required for weekday and peak hour.

Significant findings with respect to the parking problem in Providence are recited as follows:

1. 26,000 passenger cars, or 54 percent of the total number, could by-pass the central business district between 8:00 A.M. and 5:00 P.M. if proper by-pass facilities were developed.
2. 500 additional parking spaces are needed to serve present (1945) demands in or near the heart of the central business district.
3. Because of high land values in the heart of the central business district the solution seems to be the expansion of existing facilities and the development of new ones on the fringe of this critical area.
4. An estimated 180-250 additional spaces will be needed each year to keep pace with the demand.
5. It should be possible to open up new lots within suitable walking distances to destinations in vacant areas or where obsolete buildings can be razed.
6. Ratios of floor areas of traffic generators to parking spaces as derived in the parking survey should be used in computing capacities required in additional parking facilities.

¹This paper is a brief of parts of a comprehensive report of a survey on parking bearing the same title and published by the Rhode Island Department of Public Works. The section entitled "Demand for Parking Facilities," treating of demand and deficiency in terms of destination is a unique analysis in the field of parking and is included in full.