STATE UNIVERSITY OF NEW YORK

AT

AT STONY BROOK

TECHNICAL ASSISTANCE OFFICE

REGIONAL DATA BANK

SECOND ANNUAL REPORT

MARCH 1970

TABLE OF CONTENTS

SECOND ANNUAL REPORT OF THE STATE UNIVERSITY AT STONY BROOK REGIONAL DATA BANK

March 31, 1970

Our efforts in the last year have concentrated primarily on regional transportation modeling and on developing capabilities for extracting information from the 1970 Census of Population Summary Files.

We expect the faculty to make extensive use of the Census Data, and we will also be working closely with various government agencies to develop geographic guides and directories to facilitate the Census analysis process for this region.

We would like to express our appreciation to the staff of the Computing Center, most especially to the operations personnel, for their extra efforts and patience in assisting us with the Transportation Modeling System which has now been fully implemented. Since this system and most of its original data was developed outside of the University, we did experience some difficulties in attempting to make the Model operational on our hardware.

We would also like to mention that the success of the Transportation Modeling project was in no small way, a result of joint efforts. Many individuals from the Bi-County Commission as well as the personnel of Wilbur Smith and Associates, the designer of the model, gave abundantly of their time, talent and energy whenever it was required.

On the following pages, we will attempt to briefly describe our activities. We invite all members of the university community to call on us for any further information.

Walter F. Dunne
Technical Assistance Office
Computing Center

II. TRANSPORTATION MODELING ACTIVITIES

In attempting to present the basic elements of the Traffic Modeling System, it quickly became apparent that a partial or summary description would be quite inadequate. So as not to burden the majority of readers with the details and complexities of the model, we will limit our comments in this section to a summation of our activities with the Model. For those who are interested in the basic design philosophy and supportive data, we include in Attachment A a fairly complete presentation. We have reproduced certain portions of that Attachment with the permission of both Wilbur Smith and Associates, Transportation and Urban Planning Consultants, Columbia, South Carolina and the Nassau Suffolk Bi-County Planning Commission, Hauppauge, New York.

Transportation planning has undergone rapid development over the last 10 years incorporating many of the new concepts of modern science and technology. This evaluation has been primarily the result of the heavy reliance upon the digital computer by those responsible for the transportation planning process. Most of the methods and techniques used in today's transportation planning simulate real life processes through millions of mathematical operations which would not be possible without the speed and reliability of the computer.

In July of 1969, a calibrated model was established and made operational at Stony Brook. This was as a result of a contractual agreement entered into between the Nassau-Suffolk Bi-County Planning Commission and Wilbur Smith and Associates. The highway network as depicted by the model as well as the trip assignments to it corresponded quite closely with the existing highway system and actual traffic counter readings as of 1966.

We then went on, in a short period of time, to generate four new highway networks as the planners thought they might look in 1985:

Network 1 - Existing system and State proposed improvements and North Shore Corridor Expressway and Sunrise Corridor Expressway and the A. O. Smith Expressway

Network 2 - State proposed improvements only

Network 3 - Network 1 plus Nassau North-South Expressway

Network 4 - State proposed improvements and A. O. Smith Expressway.

New trip matrices were then generated, using projected 1985 population and income data. These matrices were assigned to each of the 4 variations of the 1985 network and outputs produced which depicted each link of the network and the daily volume it would be handling. The information was subsequently used in a comprehensive transportation report made by the staff of the Bi-County Planning Commission to its Board of Commissioners.

Common to all of these assignments was the fact that trip matrices were generated using an existing land use scheme. Since last summer we have created two new models, each using a different land use scheme. In the future, we no doubt will be experimenting with further variations of land use. Major land use variations necessitate a complete rebuilding of the trip matrices in contrast to network changes which are relatively simple to implement. The process of rebuilding the trip matrices involves some 15 different computer programs, some executed several times, ranging from a land use update, through a gravity based trip distribution to an add matrix routine which produces the final trip tape. Along the way, controls must be constantly observed to insure accuracy.

In addition to the 3 major models that we have constructed, we have also produced many special analyses such as:

1- 1985 trip volumes to and from selected zones in the area of the proposed Nassau Sky Bus Loop. August - 1969. This information was helpful in assessing whether or not the majority of users of such a system would originate in the immediate area or would be entering from outlying zones.

2- 1966 and 1985 trips to and from New York City, September - 1969. An analysis to determine the increase in volume as it would affect the various origin and destination zones both within the Bi-County area and the City of New York.

3- 1966 and 1985 Select Link Analysis* of that portion of the Long Island Expressway that crosses the City line, November - 1969. To determine future volumes.

4- 1966-1985 trips to and from all zones in the Town of Huntington, November 1969. An attempt to more carefully pinpoint the effects of future growth in this area.

5- Town of Huntington - Route 110 and Jericho Turnpike. A Select Link Analysis for both 1966 and 1985, December 1969. To determine what the make-up is and will be of the traffic at this major intersection for purposes of assessing the benefits, if any, of a proposed cloverleaf complex.

6- 1966 and 1985 Babylon and Bayshore - Select Link Analysis, December 1969. To assist in determining whether or not a proposed limited access super highway will alleviate the traffic problems in this area.

* A link analysis examines a specific roadway by assigning appropriate trip matrices to the network and then listing the origin, destination and volume for each zone that feeds traffic to or attracts traffic through the specified link. A zone analysis merely reflects the distribution of trips between selected zones without directly considering the specific routes.

Recently we have assisted in a study of the affects that a proposed re-zoning of portions of the Melville industrial area might have on the existing and proposed roadways in that area. We also expect to perform analyses on the affect of the proposed Connecticut bridges and what would be the consequences, in terms of the highway system, of their being built in any of the several locations that have been proposed.

III. CENSUS ACTIVITIES

For the last year and a half, we have been registered with the Bureau of the Census, Department of Commerce, as a summary tape user. As a result of this, we have in our files a significant amount of documentation regarding the 1970 Census, and in particular, the summary tapes that for the first time, are considered 'official' Census publications. The census data which is currently being compiled by the Bureau, will be released on magnetic tape much earlier than was possible when printed matter was the only official publication process.

There will be some six counts made of the basic census data, the first count is scheduled to be released on summary tapes the latter part of this year. This count will group data into Enumeration District and Block Group summaries. Summaries for Census Tracts and Minor Civil Divisions will be released during the first part of 1971, Block Summaries during the middle of 1971, State, County, Places, Standard Metropolitan Statistical Areas toward the end of 1971, Zip Code Summaries and Cities of more than 100,000 during 1972. Additionally, public samples (1 to 1000 and 1 to 10,000) will be released at an unspecified time.

The Bi-County Planning Commission will be supplying us with all necessary tapes for this region. Faculty and students are invited to use this data but those who think they might be needing other data should make their desires known as soon as possible.

We have obtained from the Bureau of the Census, a first count test tape. This tape was compiled from a sample 'dress rehearsal' census that was taken in Dane County, Wisconsin during 1968. Dane County is populated by some 277,000 persons which, by our region's standards, would be considered small. However, the format of the data is very similar to what we will be working with, and thus provides an excellent data base for developmental work.

Because of manpower limitations, our approach in developing procedures for analyzing census data will be to take advantage of existing 'canned' software packages whenever possible. In line with this, we have performed some analyses of the Dane County test data. (See Attachment B). The basic process used in producing this type of report is, first, to write a small Fortran program which picks off and explodes into raw data those summary data fields which are to be tabulated, formatting this information into a very small record with the appropriate geographic identifier. This exploded file is then fed to the Crosstabs II* package which performs the desired computation and tabulation.

The chief advantage of this technique is that statistical tabulations can be performed with a minimum of programming and testing time. However, it does consume somewhat more computing time than would custom tailored programs and on data bases as large as we expect to be handling, this has to be an important consideration.

* Proprietary software - Developed by Cambridge Computer Associates, Inc.

We have been investigating other available packages but have not had the opportunity to run any tests. Among these is ADMATCH, a package of user-oriented programs and documentation developed by the Census Use Study, which will assist in the assignment of geographic codes to data records containing street addresses. This will be of value on those applications where address coding guides and geographic base files must be referenced enabling additional geographic coding to be appended to the Census summary data. Other packages under investigation are Qwick Qwery* and certain generalized statistical packages such as the BIOMED system from the University of California.

Additionally, we expect that the Bi-County Commission will soon be developing and forwarding to us, map coordinates for Suffolk County, so that along with what is already in the Data Bank for Nassau, we will have the capability to utilize computer graphics procedures on the 1970 census data.

* Proprietary software - Consolidated Analysis Centers, Inc.

IV. OTHER ACTIVITIES

SYMAP* - We have received an updated version of this package which will result in more efficient execution for certain options. However, some testing revealed that running times for conformant type mapping options had not been improved significantly.

Technical Assistance Office - Client Information - Through efforts on the part of the staff of this office, the 1969 Dun and Bradstreet File of Nassau-Suffolk manufacturing concerns has been kept current. Changes of address, key personnel and Standard Industrial Classification have been made where appropriate. In addition, some 700 organizations and individuals that T.A.O. deals with have been combined into this file. The file now consists of over 5000 records, and we have the capability of selectively extracting records based on criteria such as number of employees, SIC codes, number of years in business, annual sales, location and for Nassau County, net worth.

We have consulted with certain faculty in regard to the 1970 Census data and some students have availed themselves of the documentation that we have compiled in regard to the Traffic Model. In addition, we have provided client information services to the Technical Assistance Office and have assisted the Office of Student Affairs in cross tabulating the results of several surveys that they have conducted.

* SYMAP (SYNAGRAPHIC Computer Mapping) is a Fortran IV program developed at Harvard University's Laboratory for Computer Graphics.

V. DATA BANK INVENTORY

File ID or DSNAME	SOURCE	YEAR	DESCRIPTION	FIELDS OF DATA
DATABK1	Dun and Bradstreet, Inc. (Updated with T.A.O. Client Information)	1969	Approx. 5000 Firms in Nassau-Suffolk engaged in Manufacturing	Name of Establishment Street address City/Town Name Zip Code County Code Duns Number Standard Industrial Classification Number of employees Sales Mailing Address Name of Chief Executive Officer Net Worth (For Nassau firms only)
NET66	Nassau-Suffolk Bi-County Planning Commission	1969	1966 Highway Network Nassau-Suffolk	For all links in Network Jurisdiction Distance Average Travel Time Speed
NET185	SAME	1969	Estimated 1985 Highway Configuration with major improvements	SAME
NET285	SAME	1969	Variation of NET185	SAME
NET385	SAME	1969	Variation of NET185	SAME
NET485	SAME	1969	Variation of NET185	SAME
TRIP66	SAME	1969	Traffic Model Trip Matrices for year 1966	Zones Inter-Zone Volumes

TRIP85	SAME	1969	Traffic Model Trip Matrices for Year 1985	SAME
TRIP285	SAME	1970	Traffic Model Trip Matrices for Land Use Scheme 2	SAME
TRIP385	SAME	1970	Traffic Model Trip Matrices for Land Use Scheme 3	SAME
LAND66	SAME	1969	Actual Land Use By Quarter-Square Mile Grids for Nassau-Suffolk	Square Mile Zone (X-Y Coordinates) Quarter Square Mile Sector Acres by type of use Residential 1 " 2 " 3 " 4 Commercial 1 " 2 Industrial Institutional Recreational 1 " 2 Agricultural Transportation
LAND85	SAME	1969	Estimated for 1985-Normal expected growth	SAME
LAND285	SAME	1970	Estimated for 1985-with major variations	SAME
LAND385	SAME	1970	Estimated for 1985-with major variations	SAME
CenDANE	U.S. Bureau of the Census	1969	First Count Test Summary File for Dane County, Wisconsin	Refer to 1970 Census Users Guide
*First Count Summary Tapes	U.S. Bureau of the Census	1970	Files A and B for New York State Files B for Connecticut and New Jersey	Refer to 1970 Census Users Guide

*These tapes (approximately 12) have been ordered by the Bi-County Planning Commission for use by the Commission and the University. As soon as they are released, (scheduled OCT-DEC 1970) they will be available at the Computing Center.

TS313	Tri-State Commission	1968 Home Interviews Re: Trip information 20,526 returns. From Nassau County sorted into type of trip, origin tract, destination tract sequence (Both trip ends in this file are in Nassau)	Trip Origin State County MCD X-Y Coordinates Census Tract Trip Purpose Time Trip Destination Same as above Mode of Travel Vehicle availability Tripmaker Personal Data Modes of Links
TS1186	Tri-State Commission	1968 Home Interviews Re: Trip Information 9109 responses from Nassau-unsorted (only one end of trip in Nassau County)	Same as above
DATABK (1,SL)	Nassau County Planning	1965 Census Information 240 240 Census Tracts in Nassau County	Total Population Non white population Median age population Tract Area (Relative-produced by computer)
DATABK (2,SL)	Nassau County Planning	1960 Population 240 Census tracts in Nassau County	Population
DATABK (3,SL)	Nassau County Planning	1960 Population Density 240 Census tracts in Nassau County	Population Density Population Area in Acre (Manually Calculated)
DATABK (4,SL)	Nassau County Planning	Same as (2,SL) except 1965	Same as (2,SL) except 1965
DATABK (5,SL)	Nassau County Planning	Same as (3,SL) except 1965	Same as (3,SL) except 196
DATABK (6,SL)	Nassau County Planning	1960 Acres for 222 Census tracts in Nassau County	Tract Area (Relative-produced by computer)
DATABK (7,SL)	Nassau County Planning	1960 - X-Y Coordinates for Center Points of each of 222 census tracts in Nassay County	Vertical Coordinate Horizontal Coordinate (Created by computer)

DATABK (8,SL)	Nassau County Planning	1965 - X-Y Coordinates for Center point of each of 240 census tracts in Nassau County	Same as above
DATABK (9,SL)	Nassau County Planning	1965 Approximately 6600 Coordinates depicting outlines of 240 census tracts in Nassay County	Outline Coordinates (X.Y created manually)
DATABK (10,SL)	Nassau County Planning	Same as above but only for Town of North Hempstead (46 tracts)	Same as above
DATABK (11,SL)	Nassau County Planning	Same as above but only for Town of Hempstead (134 tracts)	Same as above
DATABK (12,SL)	Nassau County Planning	Same as above but only for Town of Oyster Bay (60 tracts)	Same as above
DATABK (13,SL)	Nassau County Planning	1960 - Approximately 6400 Coordinates depicting outlines of 222 census tracts in Nassau County	Outline Coordinates (X & Y created manually)
DATABK (14,SL)	Nassau County Planning	Same as above but only for Town of North Hempstead (42 tracts)	Same as above
DATABK (15,SL)	Nassau County Planning	Same as above but only for Hempstead (128 tracts)	Same as above
DATABK (16,SL)	Nassau County Planning	Same as above but only for Town of Oyster Bay (52 tracts)	Same as above
SNLHSG	Suffolk County Planning Nassau County Planning	Survey taken in Brookhaven 1968 Re: Housing and certain socio-economic factors for Selden Mastic Ronkonkoma Approximately 100 Variables from 240 Questionnaires See Attachment A for Questionnaire	Interviewer Number Community Enumeration District Race Location Building Type Building Condition Structure Type Number of Stories Basement Garage Driveway

Tenure
Length of time in building
Length of time in County
Other house in area
Dwelling unit
No. of Bedrooms
No. of persons
Heating Facilities
Fuel
Kitchen Type
Bathroom Type
Location of work for H. H.
Other employed members
Transportation type for H.H.
No. of cars

1. Relation to H.H.
2. Sex
3. Age
4. Employment Status
5. Occupation
6. Yearly wages
7. Soc. Sec. & Pensions-Yearly
8. Other Income-Yearly

1-8 Repeated for each Member

Conversion to year-round dwelling
Date of Conversion
Amount of Mortgage Payment
Amount of Home Improvement Loan
Heating Costs-Yearly
Utility Costs-Monthly
Taxes - Yearly

<u>TENANTS</u> (1-3)

1. Monthly
2. Monthly Utilities
3. Taxes

What attractions to this area
Why

			Relatives in area How has neighborhood changed Why did you convert house services need (1-8) 1. Roads 2. Schools 3. Parks 4. Sewers 5. Pub. Transp. 6. Water 7. Street Lights 8. Other
APTHSG	Bi-County Planning	Survey taken in 1968 both Nassau and Suffolk questionnaire responses from approximately 4000 tenants. See Attachment B	Prior Community Prior Dwelling Type Prior Household with Relations Number of Persons in Household Number of children in pre-school in public school other schools Number of Bedrooms Number of Autos Future Needs re: move, own house, apartment
APTBOW	Bi-County Planning	Apartment Building information approximately 300 buildings in Nassau and Suffolk	School District Area Occupied No. of Units by Bedrooms Units under Rent Control Units Vacant School Tax Paid Type of Unit-Garden, Luxury, Standard Available Parking and type

ATTACHMENT A.

* LONG ISLAND HIGHWAY TRANSPORTATION MODEL

As part of a comprehensive planning effort for Nassau and Suffolk Counties, New York, transportation was given substantial emphasis. The complete transportation planning process was employed utilizing mathematical model development and application**. A review of these models follows. The basis for model calibration was to relate trips and travel habits from surveys to socio-economic and demographic traits by areal subdivision of land.

Preparation of Input Data

One of the more complex tasks in developing models for a study area as large as Long Island is the detailed compilation and coding of the factors which influence travel desires. The information required for model development is in three basic categories:

1. Origin-destination trip ends and interchanges;
2. Socio-economic and land-use data; and,
3. A transportation network of major streets and highways.

Origin-Destination Data - A home interview survey conducted by the Tri-State Transportation Commission included all of Nassau

* Much of the material presented herein, has been obtained from Wilbur Smith and Associates and used with their permission.
** A schematic diagram of the computer modeling system can be found in Figures A and B at the end of this Attachment.

and part of Suffolk County. A one per cent sample of the dwelling units in the study area was taken and the residents of each household were asked detailed questions regarding their average weekday travel habits. These data were compiled by analysis district and expanded to represent the universe of the study area. Trips were recorded by the purpose and mode of the trip maker. Tri-State established a square mile grid system in which origins and destinations of trips were coded. Origins and destinations were further subdivided into quarter-square mile grids or subdivisions.

The grid numbering system for Long Island was not sequential since two coordinates were required to define a point on the map. The basic square mile was retained as a traffic zone but an equivalence table of sequential numbers was substituted for the "X" and "Y" coordinates of the grid system. In some cases, especially in the eastern end of Suffolk County, large areas of underdeveloped or low activity grids were grouped to form traffic zones containing areas larger than one square mile. The final grouping of traffic analysis areas resulted in a total of 763 zones in Nassau and the portion of Suffolk County contained in the survey. Trip and socio-economic data were recorded to these areas.

Trip Linking - Because of the standard origin-destination survey definition of a trip, certain trips are obtained from the surveys which are not readily related to the primary purpose of the trip maker. These included those in which the driver uses his vehicle to serve a passenger while enroute to his primary destination, or to leave his vehicle and change his travel mode.

If each of these trips were analyzed separately the relationship between the actual starting point and the ultimate destination and purpose or mode of the trip would be lost. It would also be difficult to relate land use with trip making at the destination end.

To retain the primary characteristics of the trip regarding mode, purpose, and final destination, it is desirable to combine or link the trips. As an example of "serve passenger" linking, consider the case where the driver takes a passenger to school and goes on to work. The unlinked data would indicate a trip from "home" to "serve passenger" and another trip from "serve passenger" to "work." Obviously, the primary purpose of the driver was to get to work. Two trips were, in essence, created to replace the two trips each with one end having a "serve passenger" purpose. A new trip was made for the driver with an origin at home and a destination at work with "work" as the purpose of the trip. Another trip was created with the origin at the zone in which the passenger was served and the destination again being the zone of work. The purpose of this trip was "non-home based" since neither end was at the zone of residence. The same number of trips resulted from the linking procedure. It should be noted that the passenger trip was retained as a home based auto passenger trip with a purpose of "school."

In the case of the change travel mode trips, many people in the Long Island area drive their cars relatively short distances to meet a bus or train enroute to work. In this example, the primary mode and purpose are transit and work, respectively. The two trips are linked as a transit trip from home-to-work, while the auto driver trip is eliminated.

Production and Attractions - After linking the origins and destinations, trip ends are reclassified as "production" and "attraction" trip ends. Trips made by urban and suburban residents can be divided into two basic categories: home based and non-home based. Home based trips must have either the origin or destination at the residence of the person making the trip. Non-home based trip have neither the origin nor destination as a home end.

For home based trips, the zone of the production trip end is considered to be the zone of residence, regardless of whether the home zone is the origin or destination. The other end of the trip is considered the attraction. For example, a "home-to-shopping" trip is considered to be produced by the zone of residence and attracted by the zone in which the shopping occurs. The return, or "shopping-to-home" trip is also considered as being produced at the home and attracted by the shopping zone.

The result of this recoding is two shopping productions at the zone of residence and two shopping attractions at the shopping zone. There are still two trips between the desired origin and destination, but the direction of one has been changed. The reason for this method of flopping trips is that trip generation factors (both productions and attractions) can be more easily related to land use and socio-economic data at the respective ends of the trip.

In transportation planning processes, it is conceptually difficult to describe a trip production by an urban resident as being generated or produced by places of commercial or business activity. It is far easier to relate attraction trip ends to these areas, and the production end to socio-economic characteristics of the trip maker at his place of dwelling. All non-home based trips and commerical vehicle trips are considered as being produced by the zone of origin and attracted by the zone of destination.

Preparing the Network Data - The basic data required to develop the study area network were furnished by the Tri-State Transportation Commission. After receiving the data, the study area network was reviewed by the Nassau-Suffolk Bi-County Regional Planning Board and members of the Consultant's staff. Several additional facilities were added to the network to reflect a street system which was considered detailed enough for adequate analysis of the Nassau-Suffolk area.

The data for the study area network were reformatted in order to insure usefullness as input to the Traffic Modeling System. This System, originally developed by the Consultant for the IBM 360 Model 30, was modified for use on the IBM Model 65 at the State University of N.Y. at Stony Brook. The relatively large size of the Nassau-Suffolk area necessitated this change to the larger capacity machine. In addition, it was felt that by implementing the programs at Stony Brook, future studies would be greatly facilitated.

The significant step in reformatting the data was to develop a system of intersection, or node numbers, for each street intersection in the study area. At the same time, the additional data needed to describe each link, or street segment between intersections was retrieved from the Tri-State data and reformatted as dictated by the format specifications of the various computer programs.

Zoning of the Study Area - The Nassau-Suffolk areas were divided into zones of similar characteristics with the minimum zone size being about one square mile. In the areas of lesser activity, the zones were increased in size, always in even square-mile increments. The square mile segments of the study area, as defined by the coordinate system, entirely covered by water (Atlantic Ocean, bays, or Long Island Sound) were not assigned zone numbers due to a lack of trip producing or attracting capabilities.

After zoning the study area, each zone was assigned a centroid number. These numbers began with 1 and were assigned consecutively to 783. These centroid numbers were then located within their respective zones at the center of zonal activity and connected to the street system through the use of centroid connectors.

<u>Calibrating the Network</u> - The first step in calibrating the network was to "Build the Network" using the BLDNET Program. The program reads in all link data, performs various edit routines to check for errors, and prints out a listing of any errors which may occur, as well as a description of the network. A network description is a table listing each zone and (A NODE) in numerical order and all nodes to which it may connect (B NODE), thus forming a link. For each link, the physical data (jurisdiction, distance, speed, calculated travel time, and capacity) were listed with the corresponding B node in the Table. One-way links were only listed in the direction over which the link may be negotiated. See Figure 7 at the end of this attachment for a sample printout of a network description.

The network description was then compared with the network maps and the resulting discrepancies, if any, were corrected. This portion of the calibrating procedure was repeated until the network description matched the maps as far as the links and their data were concerned.

The second phase of the calibration process was the plotting of selected trees. A tree is defined as the minimum time path from one zone to all zones in the network. Using the network as input, selected trees were built by computer and listed for subsequent plotting on prints of the network maps. The tree tab listed every node in the network, the node to which it connects in the particular tree, and the time required to reach the home zone from the particular node. After plotting the trees, showing the paths from the home zone to all other zones, an analysis was made to determine if there existed some illogical routing in the minimum paths. The necessary speed adjustments were made, and selected trees were again built and plotted. At this point, the routings appeared to be legitimate and the network was considered to be calibrated. The network was then available as input to other stages of the system.

Trip Production Model

Individual households generate the bulk of auto person trips made in any urban area so that the dwelling unit was selected as the basic analysis unit. Three main forces having the most dominant effect on trip making are first, the household's need for mobility which is determined largely by the household's location relative to the location of activities (jobs, recreation centers, shops, etc.); second, the amount of disposable income available to the household; and third, the basic purpose for which the trip is made. See Tables 1, 2, and 3.

Table 1

EFFECT OF RESIDENTIAL DENSITY ON TRIP PRODUCTION

Auto Person Trips

DENSITY (DU/Acre)	TRIPS PER DWELLING UNIT
2 or less	7.623
3 - 7	7.160
8 - 16	6.669
17 and over	3.910

Table 2

EFFECT OF INCOME ON TRIP PRODUCTION

Auto Person Trips

ANNUAL FAMILY INCOME	TRIPS PER DWELLING UNIT
$ 2,999 or less	1.904
3,000 to 3,999	2.943
4,000 to 4,999	4.223
5,000 to 5,999	5.104
6,000 to 7,499	6.459
7,500 to 9,999	6,969
10,000 to 14,999	8.015
15,000 to 24,999	9.145
$25,000 and over	10.667

Table 3

EFFECT OF TRIP PURPOSE ON TRIP PRODUCTION

Auto Person Trips

TRIP PURPOSE	TRIPS PER DWELLING UNIT
Work	1.381
Shopping	1.305
School	0.305
Social-Recreation	0.689
Other Home Based	1.147
Non-Home Based	1.856

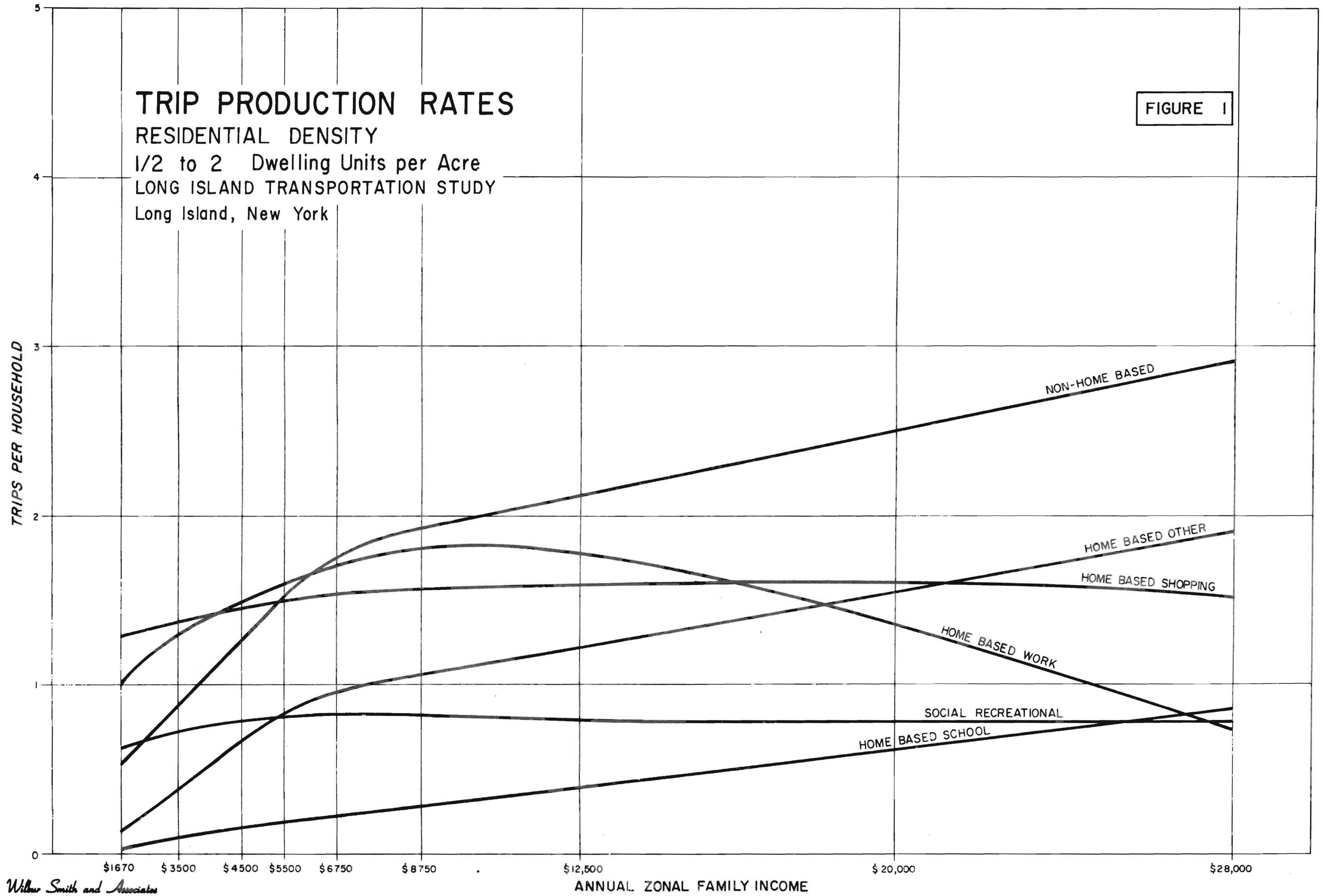
In addition to the effect of difference in trip production rates stratified by trip purpose, there are also distinct differences in the aggregate trip distribution charactersitics of the various purposes.

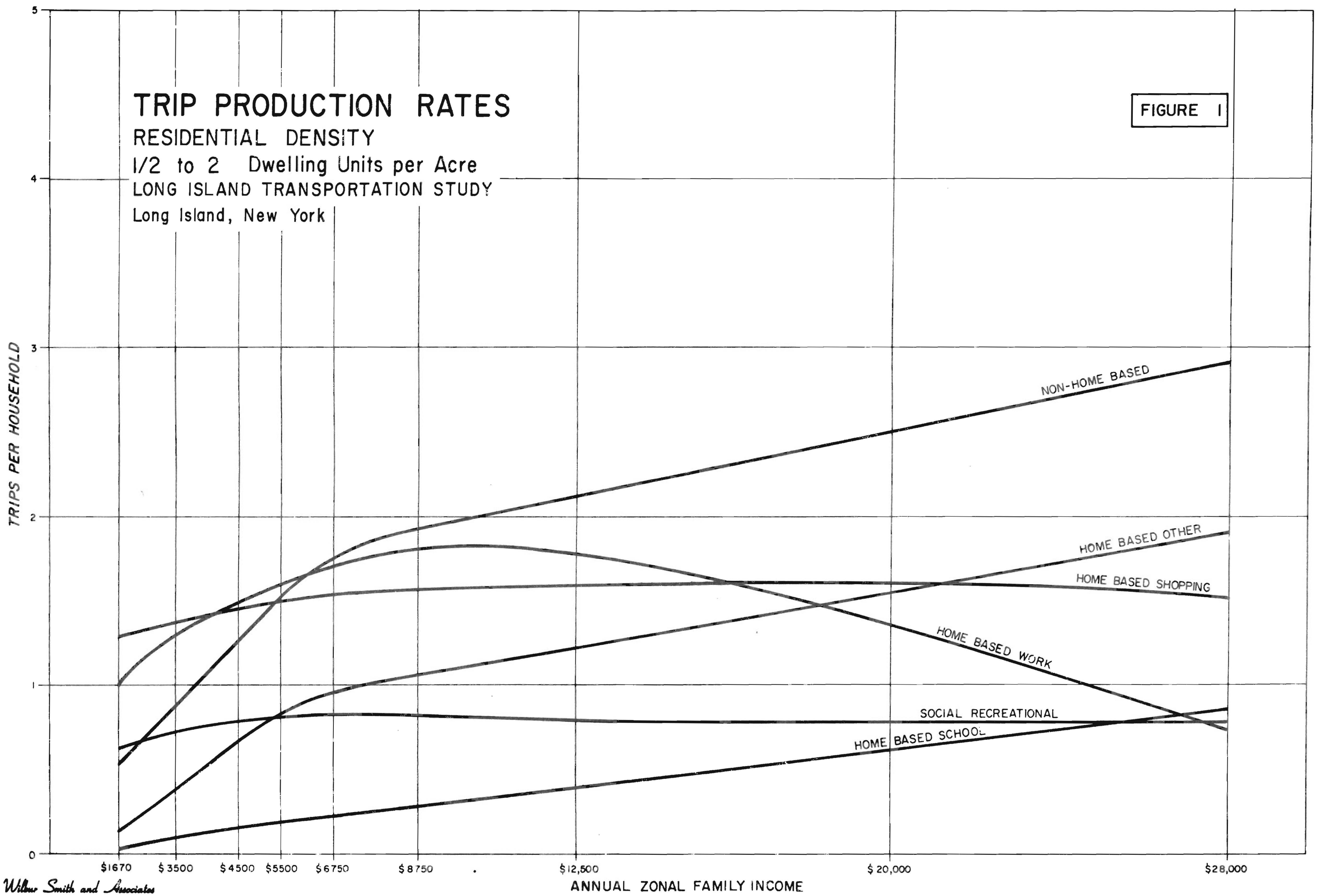
Trip Rate Models - The trip production models developed for Nassau and Suffolk Counties consist of a set of trip rate curves which relate trips per household to average household income for each trip purpose and one of four residential density groupings. It should be noted that the data for non-home based trips were tabulated at the zone of residence of each household regardless of the actual zone of origin or destination of the trip. The reason for this was to analyze the production rate of non-home based trips in relation to the socio-economic and land-use characteristics of the household without regard to the spatial location of such trips. The trip rate model for non-home based trips was used to establish overall trip totals while the spatial location of non-home based trip ends will be determined by the trip attraction model.

Figures 1 through 4 depict the series of trip rates in the three dimensional interrelationship of the previously discussed factors relating to trip production.

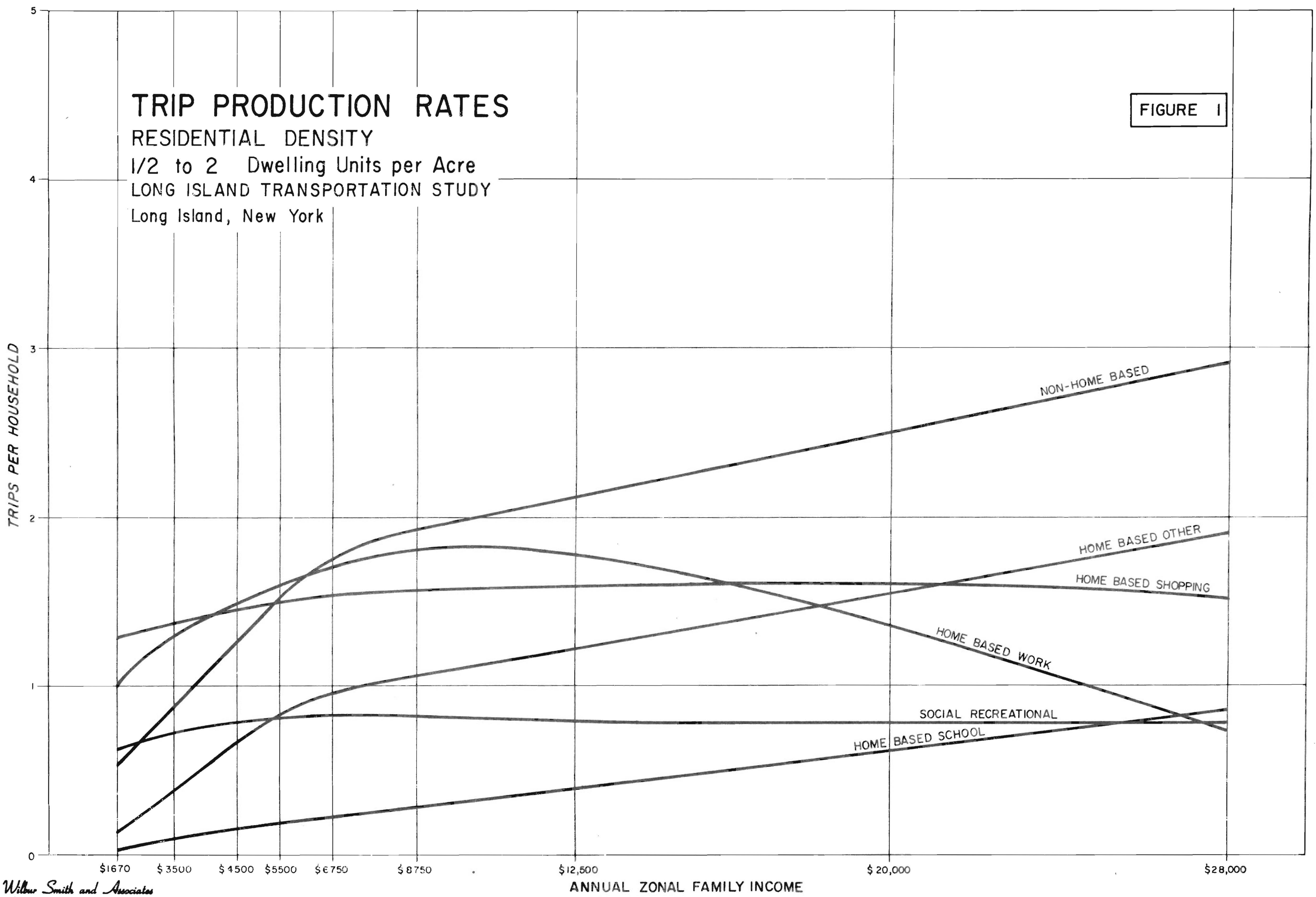
Trip Attraction Model

Internal trips produced are attracted in the study area. To a greater extent than trip productions, attraction character-

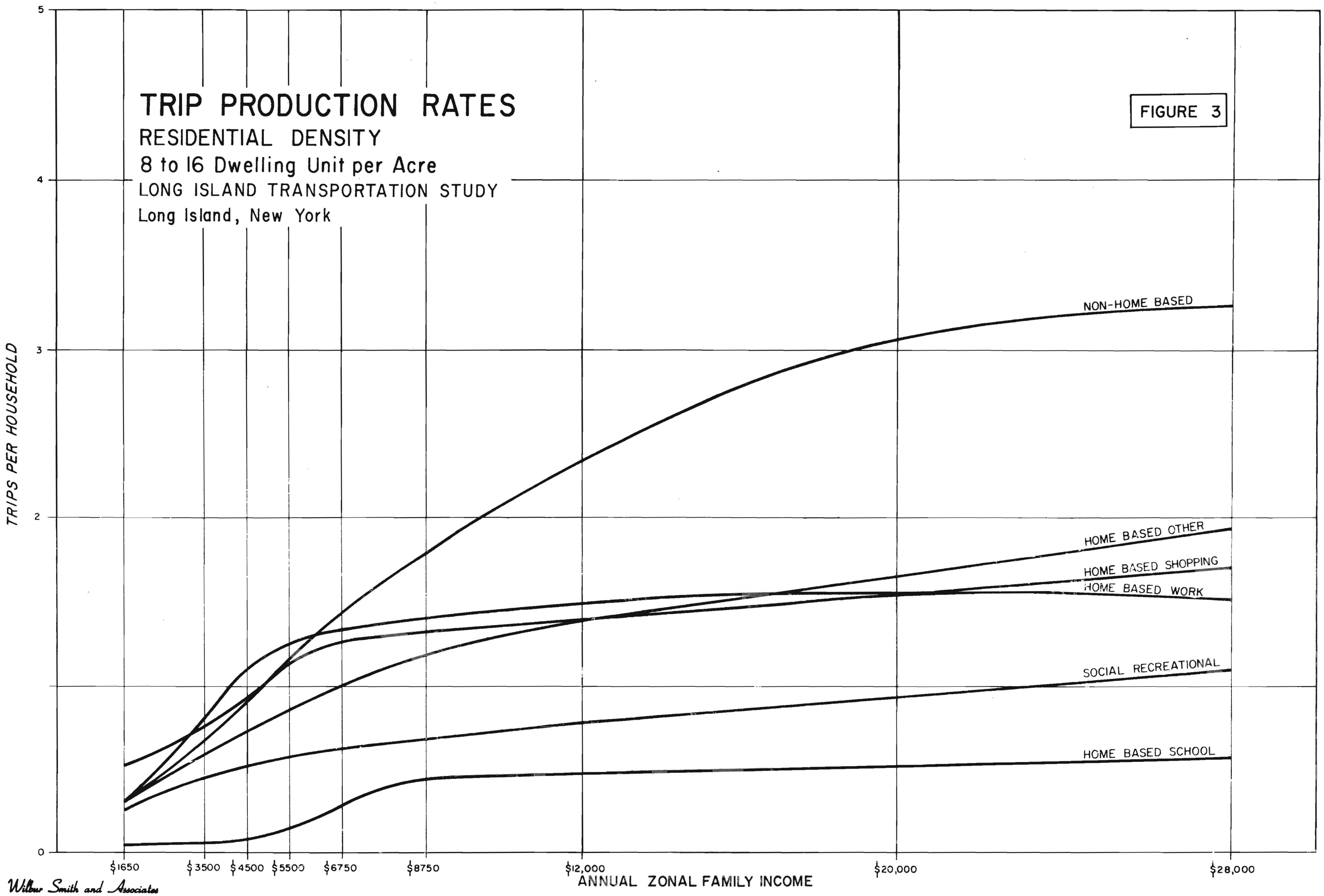

TRIP PRODUCTION RATES
RESIDENTIAL DENSITY
1/2 to 2 Dwelling Units per Acre
LONG ISLAND TRANSPORTATION STUDY
Long Island, New York
FIGURE 1
TRIPS PER HOUSEHOLD
0
1
2
3
4
5
NON-HOME BASED
HOME BASED OTHER
HOME BASED SHOPPING
HOME BASED WORK
SOCIAL RECREATIONAL
HOME BASED SCHOOL
$1670
$3500
$4500
$5500
$6750
$8750
$12,500
$20,000
$28,000
ANNUAL ZONAL FAMILY INCOME
Wilbur Smith and Associates



Wilbur Smith and Associates



Wilbur Smith and Associates



TRIP PRODUCTION RATES
RESIDENTIAL DENSITY
8 to 16 Dwelling Unit per Acre
LONG ISLAND TRANSPORTATION STUDY
Long Island, New York
FIGURE 3
TRIPS PER HOUSEHOLD
5
4
3
2
0
NON-HOME BASED
HOME BASED OTHER
HOME BASED SHOPPING
HOME BASED WORK
SOCIAL RECREATIONAL
HOME BASED SCHOOL
$1650
$3500
$4500
$5500
$6750
$8750
$12,000
$20,000
$28,000
ANNUAL ZONAL FAMILY INCOME
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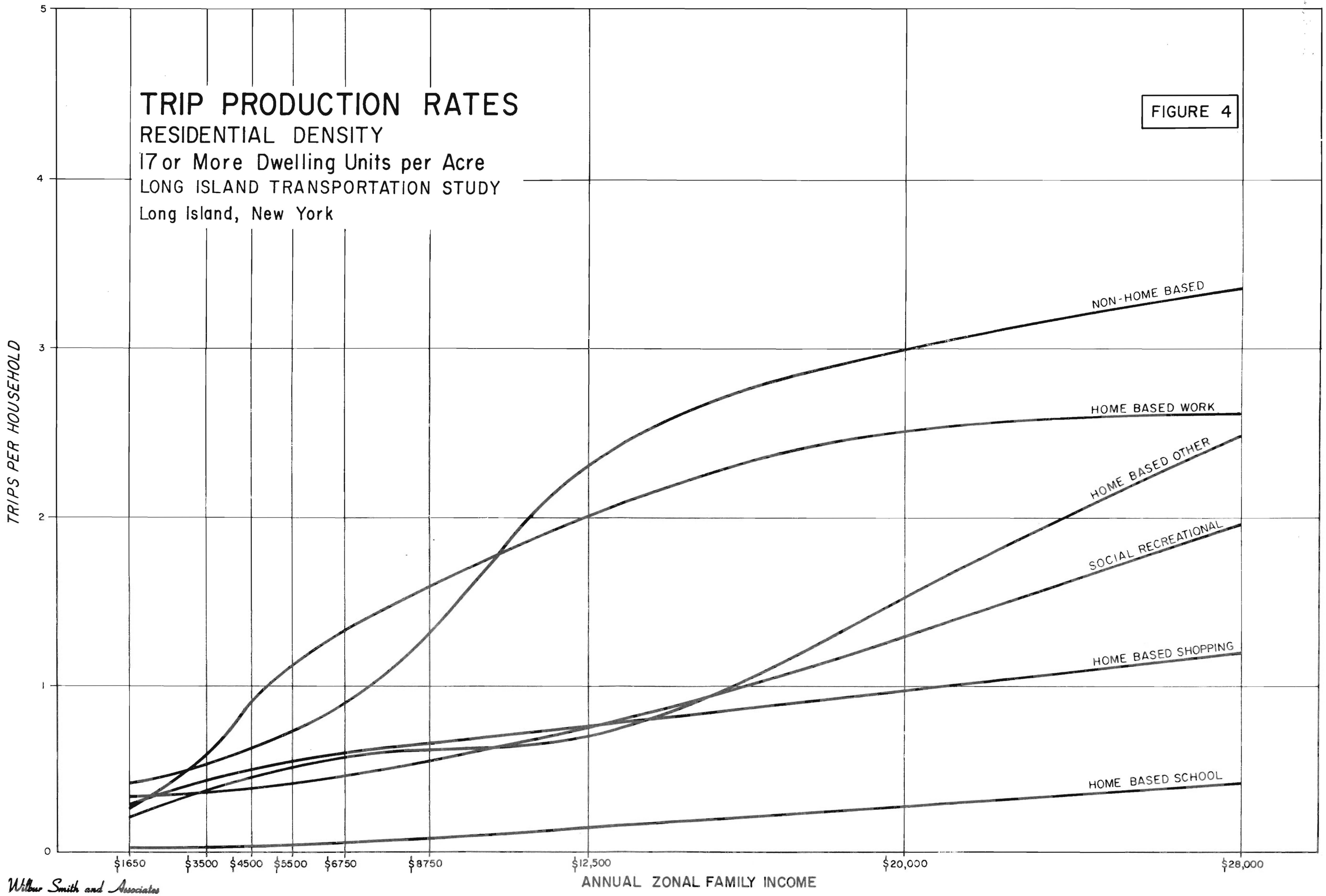

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Table 4

TRIP ATTRACTION RATES

Long Island Transportation Study

LAND USE (1)	TRIP PURPOSE: WORK	SHOPPING	SCHOOL	SOCIAL RECREATION	OTHER	NON-HOME BASED	TOTAL AUTO PERSON TRIPS	COMMERCIAL VEHICLE TRIPS
Residential 1	0.072	0.0	0.0	0.321	0.138	0.422	0.952	0.364
Residential 2	0.181	0.004	0.002	0.909	0.315	1.409	2.820	1.000
Residential 3	0.332	0.002	0.002	1.694	0.696	2.480	5.205	2.017
Residential 4	0.341	0.0	0.0	3.284	1.051	4.031	8.709	3.456
Commercial 1	25.026	62.211	0.037	2.394	30.192	38.290	157.969	10.060
Commercial 2	41.878	139.198	0.172	2.895	28.589	65.960	289.542	1.600
Industrial	26.976	0.128	0.0	0.0	1.216	3.835	32.154	1.378
Institutional	7.410	0.005	11.686	2.550	7.507	4.153	30.890	0.587
Recreational 1	0.418	0.0	0.0	3.015	1.019	0.745	5.206	0.037
Recreational 2	0.058	0.0	0.0	0.333	0.209	0.145	0.722	0.010
Agricultural	0.288	0.105	0.0	0.037	0.241	0.250	0.922	0.375
Transportation	6.612	0.0	0.017	0.815	5.024	24.046	36.514	5.022
Weighted Average	2.787	2.647	0.786	1.396	2.322	3.750	13.687	

(1) The following definitions apply to the 12 land-use categories:

"Residential 1" - 1/2 - 2 Dwelling Units per acre
"Residential 2" - 3 - 7 Dwelling Units per acre
"Residential 3" - 8 - 17 Dwelling Units per acre
"Residential 4" - 17 and over Dwelling Units per acre
"Commercial 1" - High Density Commercial
"Commercial 2" - Low Density Commercial
"Industrial" - Light and Heavy Industry
"Institutional" - Schools and other institutions
"Recreational 1" - Active recreational areas (race tracks,etc.)
"Recreational 2" - Passive recreational area(game preserves,etc.)
"Agricultural" - Land devoted to agricultural uses
"Transportation" - Highway,rail,terminals, and other uses devoted to movements of people and goods

Car Occupancy Model

Major emphasis has been given to driver trips in model development for Long Island because of the dominance of the automobile for internal person trips. This technique allows the incorporation of the models in a modal split analysis, if at some future date transit trip making is to be analyzed.

Car occupancy is conveniently expressed as the percentage of car-driver trips to all person trips made by car. Factors which have been found to affect car occupancy are the purpose and length of the trip. Table 5 illustrates the significant effect of trip purpose upon car occupancy.

Table 5

NUMBER AND PERCENTAGE OF CAR DRIVER TRIPS IN RELATION TO TOTAL PERSON TRIPS BY CARS AND PURPOSE OF TRIPS

Long Island Transportation Study

PURPOSE	PERSON TRIPS BY CAR	CAR DRIVER TRIPS	PER CENT CAR DRIVERS	AVERAGE OCCUPANCY (1)
Home Based Work	700,042	582,884	83.3	1.20
Home Based Shopping	664,292	459,679	69.2	1.45
Home Based School	197,288	83,786	42.5	2.35
Home Based Social-Recreation	350,388	199,380	56.9	1.76
Home Based Other	584,464	379,086	64.9	1.54
Non-Home Based	942,688	687,786	73.0	1.37
ALL PURPOSES	3,439,162	2,392,601	69.6	1.44

(1) Persons per vehicle.

The occupancy models developed for use in this study consist of a set of diversion curves which express the percentage of car-driver trips of all person trips made by car as a function of the trip purpose and length of the trip. Figure 5 illustrates the division curves used for the six trip purposes. Home based, social-recreation trips indicate a constant occupancy factor.

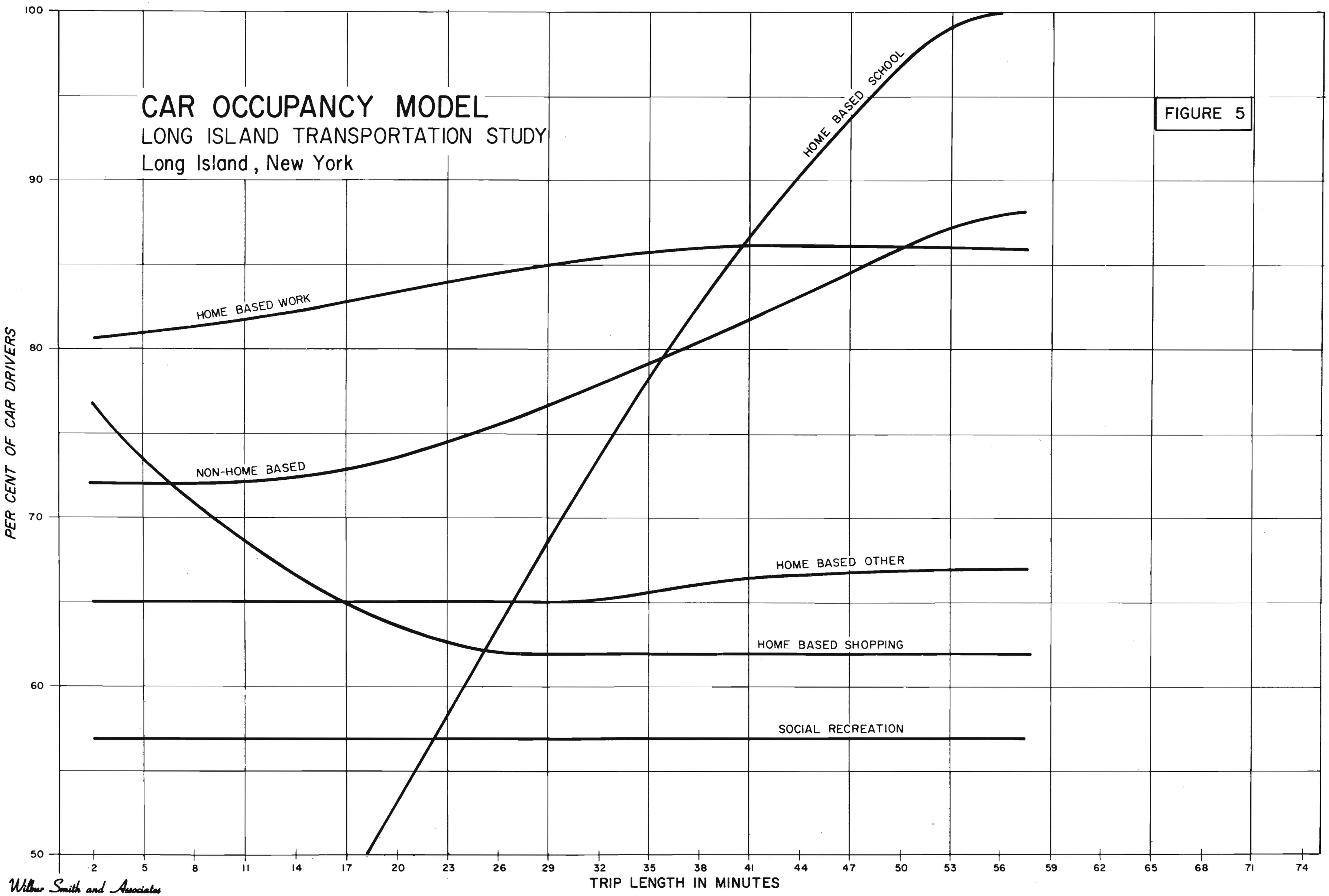
Trip Distribution

Synthetic distribution of trips in an urban area is an important and complex phase of the transportation planning process. It provides the planner with a systematic procedure of estimating zonal trip interchanges for alternate plans of land use and transportation facilities. Trip interchange between zones constitutes a basic part of the travel information necessary for transportation planning.

Trip Distribution Model Theory

There are several theories which form the basis for mathematical trip distribution models, but the method most widely adopted is based on the theory of gravitation, or interactance. The following interactance model theory is the basis for the synthesis of travel patterns in the Long Island Transportation Study:

$$T_{i-j} = P_i \frac{A_j \cdot F_{i-j}}{\sum_{j=1}^{n} (A_j \cdot F_{i-j})}$$


CAR OCCUPANCY MODEL
LONG ISLAND TRANSPORTATION STUDY
Long Island, New York
FIGURE 5
HOME BASED SCHOOL
HOME BASED WORK
NON-HOME BASED
HOME BASED OTHER
HOME BASED SHOPPING
SOCIAL RECREATION
PER CENT OF CAR DRIVERS
TRIP LENGTH IN MINUTES
100
90
80
70
60
50
2 5 8 11 14 17 20 23 26 29 32 35 38 41 44 47 50 53 56 59 62 65 68 71 74
Wilbur Smith and Associates

Where: T_{i-j} = Trips produced in zone i and attracted to zone j.

P_i = Trips attracted to zone i.

A_j = Trips attracted to zone j.

F_{i-j} = An empirically derived travel time factor which reflects the effect of spatial separation on trip interchange between zones i and j.

n = number of zones

Origin-destination and travel time surveys conducted by the Tri-State Transportation Commission were the source of the following:

1. Trip production in each zone (P_i);
2. Trip attraction to each zone (A_j);
3. Base-year trip table ends (T_{i-j}); and,
4. Spatial separation (travel time) between each zone and all other zones in the study area.

The only unknowns were the relative distribution rates which were determined by successive runs of the interactance program. The inputs to the program were all parameters on the right side of the interactance model equation, including an initial approximation of the relative distribution rates.

Using the survey trip pattern as a base, these rates were adjusted after each calibration run of the program until the trip length distribution, total person trips, average trip lengths, and person-hours of the synthetic trip patterns were within specified limits of the survey characteristics.

When these processes were complete, the interactance model was considered to be "calibrated". The relative distribution rates which yielded a satisfactory synthetic trip distribution for the base year were assumed to remain constant for use in distributing future year trip ends.

Calibrating the Model

There are basically four phases involved in calibrating a trip distribution model. For the Long Island Transportation Study, the initial phase involved organizing the survey data into a useful form for analysis purposes. The survey data, for which the models are to be calibrated, were edited, sorted, linked, and grouped into the selected categories. Then, minimum path travel times were developed between each zone and all other zones in the study area.

In the second phase, use was made of the previously processed trip survey records to obtain complete tables of intrazonal and interzonal movements for each trip purpose. From these tabulations, the number of trips produced in (P_i) and attracted to (A_j) each zone in the study area was obtained for each purpose category. In addition, the resulting zone-to-zone movements and the minimum-path travel time between zones were utilized to obtain the frequency distribution of trips, by lengths, in one-minute intervals for each trip purpose.

During the third phase, relative distribution rates were developed for each of the distribution models to be calibrated. Trip productions (P) and attractions (A) by zone, together with minimum-path travel time between zones and the initial approximation of the relative distribution rates were inserted into the distribution model formula and the resulting trip interchanges $(_{i-j})$ calculated. This synthetic trip frequency distribution was then manually compared with the appropriate frequency distribution previously obtained in phase two, and the initial approximations of the relative distribution rates were adjusted accordingly.

A new set of trip interchanges was calculated and the process of trial and adjustment continued until the synthetic distributions agreed, within allowable limits, with the survey trip distributions.

Phase four provided for the testing of the calibrated models to assure accurate simulation of present travel patterns.

<u>Summary Trip Distribution</u>

The result of various statistical tests and traffic assignment comparisons indicated that the trip distribution models for the Study were properly calibrated and will reliably distribute base-year trip ends. Charts and tables are available which serve to further illustrate these calibrations. A sample traffic assignment listing can be found in Figure 6.

External Trip Models

A significant portion of the trips in the study area, especially in Nassau County, cross the Nassau-Queens County line. Of the 3,288,410 vehicle trips made on an average 1963 day in Nassau and Suffolk Counties, 319,409, or approximately 10 per cent, crossed the external cordon line. Since socio-economic and land-use data were not available for the end of the trip outside the study area, another less refined method of projecting these important trips had to be used for analysis purposes.

The method selected was a growth factor technique originally presented by Thomas J. Fratar to the Highway Research Board in 1954. This "Fratar" method expands existing trip patterns based on growth factors at each end of the trip.

The basic form of the Fratar expansion program can be expressed as follows:

$$T_{i-j} = P_i \frac{F_j \cdot V_{i-j}}{\sum_{j=1}^{n} (F_j \cdot V_{i-j})}$$

and

$$P_i = E_i \sum_{j=1}^{n} V_{i-j}$$

Where: T_i = Factored trips from productions in Zone i to attractions in Zone j.

P_i = Total of factored productions for Zone i.

E_i = Production growth factor for Zone i.

F_j = Attraction growth factor for Zone j.

V_{i-j} = Initial trip volume productions in Zone i to attractions in Zone j.

The input to the program was a base year trip table of movements to be factored. Growth factors were applied to each interchange in the trip table supplied, and factoring was done in such a way that the proper number of original origins was always present. After any one application, however, actual destination totals did not always agree so that an iterative process was followed to refine the correspondence between actual and desired totals.

The trips produced inside the study area going outside were treated separately from those made by external residents who entered the study area. It was assumed that the best measure of future trips destined to Brooklyn, Queens, and Manhattan was the growth in employment in these areas. The growth in population in Nassau and Suffolk Counties was the basis of growth factors for trips coming into the area.

It is obvious that the trips made by external residents destined to Nassau and Suffolk Counties will increase at a faster rate than those leaving the area. The employment changes in New

York City, especially in Brooklyn and Queens, are anticipated to significantly increase (Tri-State indicates an overall growth of 8 per cent). However, there will be a substantial increase in the population of the two counties under study with a corresponding associated demand for external trip attractions.

TWO-WAY LINK VOLUMES

A-NODE	B-NODE	JUR.	VOLUME	B-NODE	JUR.	VOLUME	B-NODE	JUR.	VOLUME	B-NODE	JUR.	VOLUME
	7250	6	5132									
7225	940	9	483	941	9	1079	942	9	85	7201	2	1885
	7226	2	1734									
7226	953	9	166	7225	2	1734	7227	2	1702			
7227	952	9	895	7226	2	1702	7260	2	1783			
7230	933	9	168	934	9	270	7196	2	1255	7231	2	1553
7231	945	9	1651	7230	2	1553	7232	2	1714			
7232	944	9	35	946	9	937	954	9	2166	7231	2	1714
	7270	2	1864									
7235	938	9	611	949	9	59	7236	2	1914	7237	2	1582
7236	936	9	479	937	9	27	948	9	1189	7235	2	1914
	7250	2	2453									
7237	939	9	183	7235	2	1582	7255	2	1635			
7240	943	9	221	7215	2	221						
7250	947	9	1100	7220	6	5132	7236	2	2453	7270	2	3975
7255	950	9	350	7237	2	1635	7260	2	1382	7275	2	443
7260	951	9	731	7227	2	1783	7255	2	1382	7265	2	2354
7265	7260	2	2354	7266	2	1903	7275	2	1023			
7266	961	9	751	962	9	718	7265	2	1903	7290	2	2562
7270	955	9	3314	956	9	1892	7232	2	1864	7250	2	3975
	7271	8	4291									
7271	949	9	92	957	9	953	958	9	444	959	9	1457
	7270	8	4291	7285	8	4549						
7275	961	9	1037	7255	2	443	7265	2	1023	7276	2	1381
7276	960	9	756	7275	2	1381	7285	2	1543			
7285	963	9	1084	7271	8	4549	7276	2	1543	7300	2	3210
7290	966	9	2249	967	9	81	968	9	345	7266	2	2562
	7291	2	1405									
7291	970	9	97	971	9	54	7290	2	1405	7305	2	1330
7300	964	9	628	965	9	646	7285	2	3210	7301	2	3238
7301	969	9	843	970	9	273	7300	2	3238	7305	2	3548
7305	972	9	1807	7291	2	1330	7301	2	3548	7310	2	4765
7309	974	9	340	975	9	669	976	9	923	977	9	62
	7310	9	1222									
7310	973	9	1980	7305	2	4765	7309	9	1222	7311	2	2869
7311	978	9	899	7310	2	2869	7320	2	2522			
7320	979	9	1065	980	9	508	7311	2	2522	7330	2	1965
7330	981	9	752	7320	2	1965	7340	2	238	7350	2	1419
7340	982	9	334	7330	2	238	7350	2	96			
7345	984	9	522	7355	2	456	7365	2	66			
7350	7330	2	1419	7340	2	96	7355	2	1515			
7355	983	9	797	7345	2	456	7350	2	1515	7365	2	780
7365	985	9	23	7345	2	66	7355	2	780	7370	2	831
7370	986	9	831	7365	2	831						

Figure 6

NETWORK DESCRIPTION

A-NODE	JU	NODE	DIST	TIME	SP	RT	JU	NODE	DIST	TIME	SP	RT	JU	NODE	DIST	TIME	SP	RT	JU	NODE	DIST	TIME	SP	RT
	6	7250	3.25	5.55	35	55																		
7225	9	940	1.10	4.40	15	0	9	941	0.65	2.60	15	0	9	942	1.30	5.20	15	0	2	7201	1.30	2.60	30	38
	2	7226	1.25	2.50	30	38																		
7226	9	953	0.90	3.60	15	0	2	7225	1.25	2.50	30	38	2	7227	1.25	2.50	30	38						
7227	9	952	0.40	1.60	15	0	2	7226	1.25	2.50	30	38	2	7260	1.60	3.20	30	38						
7230	9	933	1.05	4.20	15	0	9	934	0.35	1.40	15	0	2	7196	3.15	6.30	30	51	2	7231	1.15	2.40	29	51
7231	9	945	0.30	1.20	15	0	2	7230	1.15	2.40	29	51	2	7232	1.40	2.90	29	51						
7232	9	944	3.00	12.00	15	0	9	946	0.60	2.40	15	0	9	954	0.55	2.20	15	0	2	7231	1.40	2.90	29	51
	2	7270	2.30	4.75	29	51																		
7235	9	938	0.70	2.80	15	0	9	949	1.90	7.60	15	0	2	7236	2.30	4.30	32	42	2	7237	2.85	5.35	32	42
7236	9	936	0.70	2.80	15	0	9	937	0.45	1.80	15	0	9	948	1.10	4.40	15	0	2	7235	2.30	4.30	32	42
	2	7250	2.40	4.50	32	42																		
7237	9	939	0.40	1.60	15	0	2	7235	2.85	5.35	32	42	2	7255	1.60	3.00	32	42						
7240	9	943	0.30	1.20	15	0	2	7215	3.67	6.50	34	38												
7250	9	947	0.55	2.20	15	0	6	7220	3.25	5.55	35	55	2	7236	2.40	4.50	32	42	2	7270	2.13	4.25	30	48
7255	9	950	1.15	4.60	15	0	2	7237	1.60	3.00	32	42	2	7260	1.70	3.20	32	42	2	7275	1.95	3.90	30	38
7260	9	951	0.70	2.80	15	0	2	7227	1.60	3.20	30	38	2	7255	1.70	3.20	32	42	2	7265	1.20	2.70	27	42
7265	2	7260	1.20	2.70	27	42	2	7266	1.60	3.20	30	42	2	7275	1.16	2.35	30	38						
7266	9	961	0.90	3.60	15	0	9	962	0.90	3.60	15	0	2	7265	1.60	3.20	30	42	2	7290	1.40	2.80	30	42
7270	9	955	0.60	2.40	15	0	9	956	0.65	2.60	15	0	2	7232	2.30	4.75	29	51	2	7250	2.13	4.25	30	48
	8	7271	2.90	6.00	29	48																		
7271	9	949	2.00	8.00	15	0	9	957	1.25	5.00	15	0	9	958	1.00	4.00	15	0	9	959	0.95	3.80	15	0
	8	7270	2.90	6.00	29	48	8	7285	1.80	3.70	29	48												
7275	9	961	0.75	3.00	15	0	2	7255	1.95	3.90	30	38	2	7265	1.16	2.35	30	38	2	7276	1.90	3.80	30	42
7276	9	960	0.40	1.60	15	0	2	7275	1.90	3.80	30	42	2	7285	1.70	3.40	30	42						
7285	9	963	0.75	3.00	15	0	8	7271	1.80	3.70	29	48	2	7276	1.70	3.40	30	42	2	7300	2.86	5.05	34	42
7290	9	966	0.70	2.80	15	0	9	967	1.25	5.00	15	0	9	968	3.20	12.80	15	0	2	7266	1.40	2.80	30	42
	2	7291	2.05	4.10	30	42																		
7291	9	970	0.65	2.60	15	0	9	971	0.95	3.80	15	0	2	7290	2.05	4.10	30	42	2	7305	1.50	3.00	30	42
7300	9	964	1.20	4.80	15	0	9	965	0.55	2.20	15	0	2	7285	2.86	5.05	34	42	2	7301	1.80	3.40	32	42
7301	9	969	0.50	2.00	15	0	9	970	0.70	2.80	15	0	2	7300	1.80	3.40	32	42	2	7305	1.45	2.70	32	42
7305	9	972	0.50	2.00	15	0	2	7291	1.50	3.00	30	42	2	7301	1.45	2.70	32	42	2	7310	0.65	1.55	25	96
7309	9	974	0.70	2.80	15	0	9	975	2.60	10.40	15	0	9	976	0.90	3.60	15	0	9	977	1.25	5.00	15	0
	9	7310	2.40	9.60	15	0																		
7310	9	973	0.50	2.00	15	0	2	7305	0.65	1.55	25	96	9	7309	2.40	9.60	15	0	2	7311	2.05	4.25	29	42
7311	9	978	0.35	1.40	15	0	2	7310	2.05	4.25	29	42	2	7320	2.35	4.85	29	42						
7320	9	979	0.80	3.20	15	0	9	980	1.30	5.20	15	0	2	7311	2.35	4.85	29	42	2	7330	4.99	7.85	38	42
7330	9	981	0.60	2.40	15	0	2	7320	4.99	7.85	38	42	2	7340	2.28	4.05	34	30	2	7350	4.10	6.45	38	42
7340	9	982	0.45	1.80	15	0	2	7330	2.28	4.05	34	30	2	7350	1.71	3.05	34	30						
7345	9	984	0.70	2.80	15	0	2	7355	2.90	5.15	34	45	2	7365	2.25	4.00	34	45						
7350	2	7330	4.10	6.45	38	42	2	7340	1.71	3.05	34	30	2	7355	0.57	1.10	31	55						
7355	9	983	0.70	2.80	15	0	2	7345	2.90	5.15	34	45	2	7350	0.57	1.10	31	55	2	7365	1.10	1.80	37	42
7365	9	985	1.30	5.20	15	0	2	7345	2.25	4.00	34	45	2	7355	1.10	1.80	37	42	2	7370	4.76	7.50	38	38
7370	9	986	0.50	2.00	15	0	2	7365	4.76	7.50	38	38												

Figure 7

DISTRIBUTION AND ASSIGNMENT FLOW CHART
LONG ISLAND TRANSPORTATION STUDY
Long Island, New York

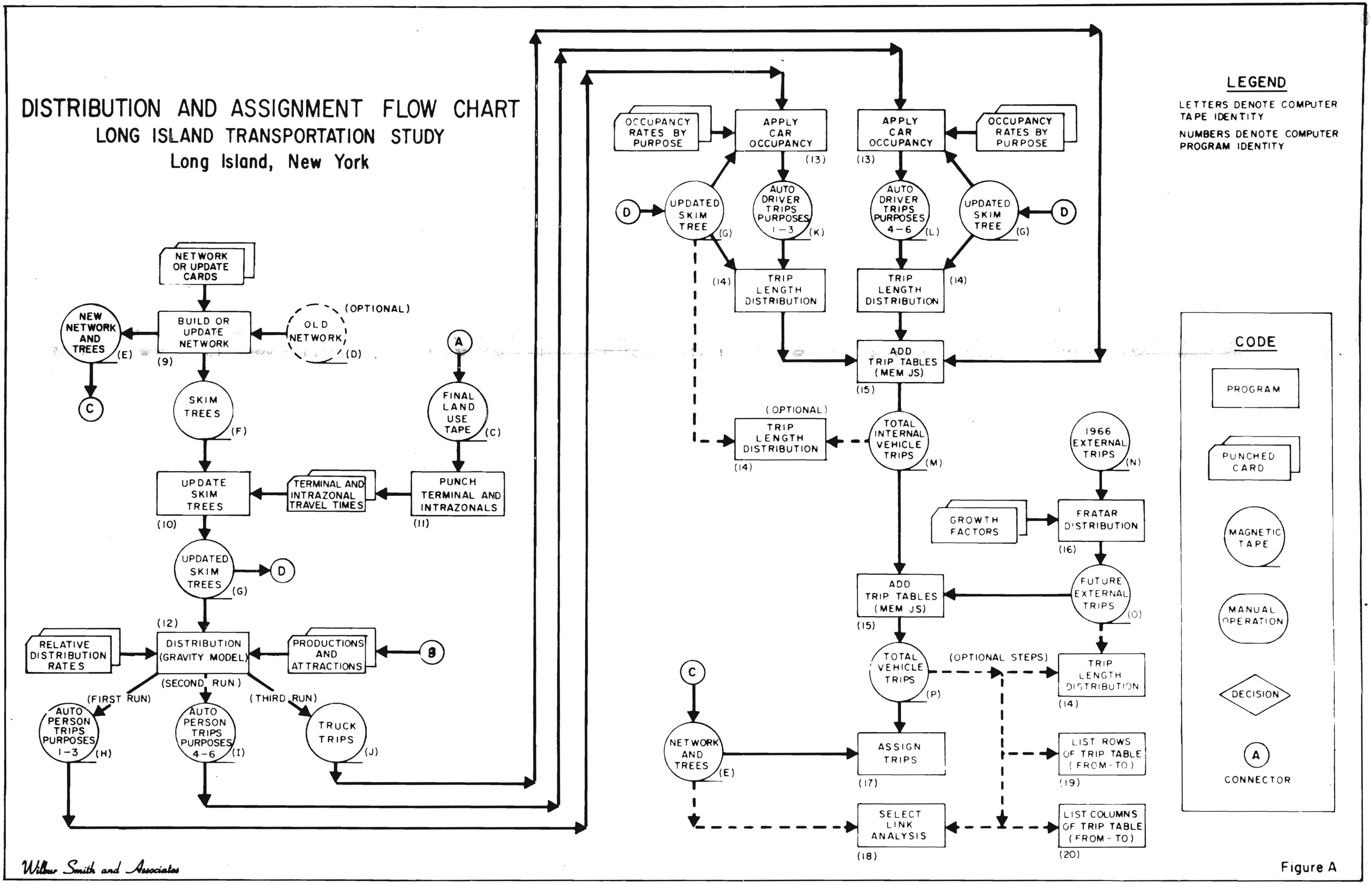


Figure A

FLOW CHART
FOR PREPARING INPUT DATA
LONG ISLAND TRANSPORTATION STUDY
Long Island, New York

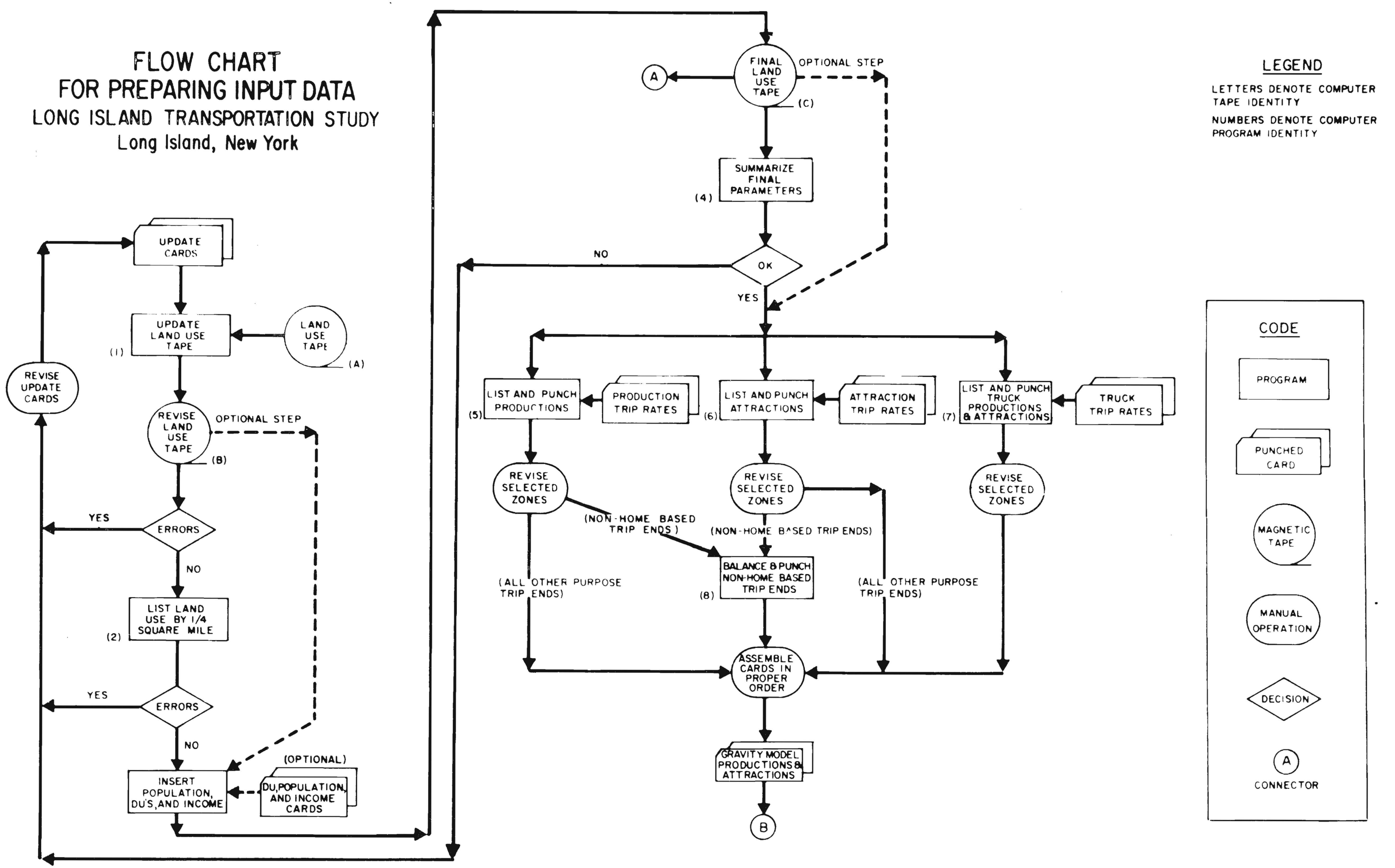


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Figure B

DUNKIRK

TOWNS = TOWN

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
UNDER5	125	115	240	RAW
	52.083	47.917	100.0	RPR
	11.241	10.56	10.904	RPC
5	28	23	51	RAW
	54.902	45.098	100.0	RPR
	2.518	2.112	2.317	RPC
6	31	27	58	RAW
	53.448	46.552	100.0	RPR
	2.788	2.479	2.635	RPC
7-9	87	90	177	RAW
	49.153	50.847	100.0	RPR
	7.824	8.264	8.042	RPC
10-13	97	103	200	RAW
	48.5	51.5	100.0	RPR
	8.723	9.458	9.087	RPC
14	24	22	46	RAW
	52.174	47.826	100.0	RPR
	2.158	2.02	2.09	RPC
15	33	27	60	RAW
	55	45	100.0	RPR
	2.968	2.479	2.726	RPC
16	18	20	38	RAW
	47.368	52.632	100.0	RPR
	1.619	1.837	1.726	RPC
17	23	29	52	RAW
	44.231	55.769	100.0	RPR
	2.068	2.663	2.363	RPC

Attachment B Figure I

TOWNS = DUNKIRK TOWN

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
18	8	12	20	RAW
	40	60	100.0	RPR
	.719	1.102	.909	RPC
19	9	9	18	RAW
	50	50	100.0	RPR
	.809	.826	.818	RPC
20	13	14	27	RAW
	48.148	51.852	100.0	RPR
	1.169	1.286	1.227	RPC
21	8	13	21	RAW
	38.095	61.905	100.0	RPR
	.719	1.194	.954	RPC
22-24	29	40	69	RAW
	42.029	57.971	100.0	RPR
	2.608	3.673	3.135	RPC
25-34	133	152	285	RAW
	46.667	53.333	100.0	RPR
	11.96	13.958	12.949	RPC
35-44	136	117	253	RAW
	53.755	46.245	100.0	RPR
	12.23	10.744	11.495	RPC
45-54	112	109	221	RAW
	50.679	49.321	100.0	RPR
	10.072	10.009	10.041	RPC
55-59	55	51	106	RAW
	51.887	48.113	100.0	RPR
	4.946	4.683	4.816	RPC

TOWNS = DUNKIRK TOWN

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
60-61	18	13	31	RAW
	58.065	41.935	100.0	RPR
	1.619	1.194	1.408	RPC
62-64	28	18	46	RAW
	60.87	39.13	100.0	RPR
	2.518	1.653	2.09	RPC
65-74	59	58	117	RAW
	50.427	49.573	100.0	RPR
	5.306	5.326	5.316	RPC
OVER75	38	27	65	RAW
	58.462	41.538	100.0	RPR
	3.417	2.479	2.953	RPC
SUMS	1112	1089	2201	RAW
	50.522	49.478	100.0	RPR
	100.0	100.0	100.0	RPC

1970 CENSUS TEST DANE COUNTY

SUMMARY FOR DANE COUNTY

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
UNDER5	4827	4583	9410	RAW
	51.296	48.704	100.0	RPR
	11.317	10.799	11.058	RPC
5	1134	1058	2192	RAW
	51.734	48.266	100.0	RPR
	2.659	2.493	2.576	RPC
6	1114	1070	2184	RAW
	51.007	48.993	100.0	RPR
	2.612	2.521	2.567	RPC
7-9	3280	3191	6471	RAW
	50.688	49.312	100.0	RPR
	7.69	7.519	7.604	RPC
10-13	4192	4008	8200	RAW
	51.122	48.878	100.0	RPR
	9.828	9.444	9.636	RPC
14	937	913	1850	RAW
	50.649	49.351	100.0	RPR
	2.197	2.151	2.174	RPC
15	894	969	1863	RAW
	47.987	52.013	100.0	RPR
	2.096	2.283	2.189	RPC
16	939	937	1876	RAW
	50.053	49.947	100.0	RPR
	2.201	2.208	2.205	RPC
17	847	773	1620	RAW
	52.284	47.716	100.0	RPR
	1.986	1.821	1.904	RPC
18	648	524	1172	RAW
	55.29	44.71	100.0	RPR
	1.519	1.235	1.377	RPC

Attachment B Figure 2

1970 CENSUS TEST DANE COUNTY

SUMMARY FCR DANE COUNTY

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
19	452	503	955	RAW
	47.33	52.67	100.0	RPR
	1.06	1.185	1.122	RPC
20	421	542	963	RAW
	43.718	56.282	100.0	RPR
	.987	1.277	1.132	RPC
21	446	550	996	RAW
	44.779	55.221	100.0	RPR
	1.046	1.296	1.17	RPC
22-24	1473	1679	3152	RAW
	46.732	53.268	100.0	RPR
	3.453	3.956	3.704	RPC
25-34	5464	5530	10994	RAW
	49.7	50.3	100.0	RPR
	12.81	13.03	12.92	RPC
35-44	4912	4613	9525	RAW
	51.57	48.43	100.0	RPR
	11.516	10.869	11.193	RPC
45-54	4132	3915	8047	RAW
	51.348	48.652	100.0	RPR
	9.687	9.225	9.456	RPC
55-59	1658	1583	3241	RAW
	51.157	48.843	100.0	RPR
	3.887	3.73	3.809	RPC
60-61	623	585	1208	RAW
	51.573	48.427	100.0	RPR
	1.461	1.378	1.42	RPC
62-64	847	798	1645	RAW
	51.489	48.511	100.0	RPR
	1.986	1.88	1.933	RPC

1970 CENSUS TEST DANE COUNTY

SUMMARY FOR DANE COUNTY

ROWS= AGE COLUMNS= SEX

	MALE	FEMALE	SUM	KEY
65=74	2017	2252	4269	RAW
	47.248	52.752	100.0	RPR
	4.729	5.306	5.017	RPC
OVER75	1397	1865	3262	RAW
	42.826	57.174	100.0	RPR
	3.275	4.394	3.833	RPC
SUMS	42654	42441	85095	RAW
	50.125	49.875	100.0	RPR
	100.0	100.0	100.0	RPC

*****TABLE TOTALS... RAW= 85095 WTD= 85095